

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
and  
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 594 (No. 20, Vol. XII.)

MAY 13, 1920

Weekly, Price 6d.  
Post Free, 7d.

## Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2

Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828

Annual Subscription Rates, Post Free

United Kingdom .. 28s. 2d. Abroad.. .. 33s. 6d.\*

These rates are subject to any alteration found necessary under abnormal conditions

\* European subscriptions must be remitted in British currency

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### DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the date of important fixtures are invited to send particulars for inclusion in the following list:

May 20 to 30	Pan-American Aeronautic Congress at Atlantic City
May 22 and 23	Aviation Competition at Juvisy in connection with Fêtes de Paris
May 23 to 30	Seaplane Contests at Barcelona
June 22 ...	Wilbur Wright Memorial Lecture, H.R.H. Prince Albert presiding, at 8 p.m., at Central Hall, Westminster. Commander J. C. Hunsaker will read a paper on "Naval Architecture in Aeronautics"
July 9 to 20	S.B.A.C. International Aero Exhibition at Olympia
July (mid.)	Seaplane Contests at Antwerp
July 24 ...	Aerial Derby
Aug. 3 ...	Air Ministry Competition (Large and Small Type Aeroplanes)
Aug. (end of)	Schneider International Race, Venice
Sept. 1 ...	Air Ministry Competition (Seaplanes)
Sept. ...	International aviation week (with competitions) at Brescia, Italy
Sept. 27 to Oct. 3	Gordon-Bennett Aviation Cup, France
Oct. 22 ...	Gordon-Bennett Balloon Race, Indianapolis, U.S.A.

## EDITORIAL COMMENT



HE seaplane races at Monaco, for which so many machines had been entered, but of which so few turned up, and to which all interested in aviation had looked forward in the hope of seeing demonstrated some real progress in the design and operation of seaplanes, is now a thing of the past.

And let it be admitted that it is one of those things of the past which one would rather forget. Not only was

### The Monaco Meeting

the meeting a disappointing affair as a meeting, but from the British point of view it was sadly neglected. The net immediate results are soon summed up.

The altitude record of the meeting was won by Cassale on a Spad-Herbemont biplane, with an altitude of 6,500 metres (21,450 ft.). The speed contest went, first to de Romanet, also on a Spad, whose speed in the first speed race worked out at 127 m.p.h. This was beaten in the second speed race by Zanetti on a Nieuport-Macchi, who did an average speed over the course, including the turns, of course, of 134 m.p.h., thereby establishing the speed-record for this year's meeting.

For what was to have been the main feature of the race, the Grand Prix de Monaco, a flight to Tunis and back, there was only one competitor, Sadi Lecointe on a Tellier-Sunbeam, and he failed to complete the course! Truly not a very glorious record to go down in the pages of aviation history. While thus the immediate results are easily stated, the consequences are far more difficult to foresee.

As a popular attraction, Monaco of the unthinking crowd, the meeting has probably been fairly successful. The French authorities certainly did their very best to camouflage the true nature of the meeting by sending a number of flying boats, some to take part in the Tunis flight *hors de concours*, and some to adorn the harbour and bay of Monaco in the absence of real competitors. As a helpful advertisement of aviation, however, the meeting was a ghastly failure. The only machine to get round the course was an old G.L. flying boat which had seen considerable service, but which was at any rate thoroughly tried out before the flight started.

# And its Lessons

The lesson of the meeting, if there is one to be learned from the half-hearted interest taken in it by constructors generally, seems to be the folly of unpreparedness, as fatal, evidently, in peace as it is in war. Not only were most of the machines entered for the Grand Prix not ready in time for the race, but those which were ready were only just finished in time, and no extended trial flights had been possible. The Tellier-Nieuport-Sunbeam machine was not in readiness at St. Raphael until two days after the meeting was due to start, and even then M. Lecoq had had no opportunity of trying out the machine. In fact, one believes that his flight from St. Raphael to Monaco was not only his first flight in that machine, but his first flight as pilot of a flying boat. Let it be clearly understood that we are not attempting to belittle his flying of the machine. On the contrary, with such a lack of practice Lecoq did uncommonly well, but it is evident that he could not have that instinctive mastery of the machine which is attained only after long practice. Again, there was no time to ascertain any of the weak points of the machine, and even the best of machines have their little idiosyncrasies. The Caudrons, which were the only other machines to arrive at St. Raphael in reasonable time after the opening date, had, we understand, never been flown previous to their flight from Paris to St. Raphael, and the machine which ultimately did get as far as Monaco—the three-engined biplane flown by Maçon—had never had its floats tested out, with the result that a faulty step design was only discovered when the machine was making its altitude elimination flight.

With regard to the Italian contingent, the Savoias and the Nieuport-Macchis, these did not arrive in time to be able to start in the Tunis flight. Altogether, then, the failure of the meeting would appear to be caused by one thing, and by one thing only: Unpreparedness. We have no doubt that excuses will be advanced. Transport difficulties, strikes, etc., will be blamed. But, after all, a state of preparedness should foresee these obstacles and, by taking them into account, see to it that they are overcome in time. It appears to us that the organisers of the meeting did all they could to make the show a success, and that constructors have only themselves to blame.

As for the part this country played, or rather did not play, in the meeting we cannot refrain from a few words of comment. Great Britain, the country which produces without a doubt the finest seaplanes in the world, was not represented at all. But this we do not only mean that no British machines were in Monaco bay, but British aviation was not even represented ashore. High officials were sent by France as well as by Italy, but as far as our representative could find, not a single official representative of any of the bodies which are supposed to represent aviation in this country was to be found in the Principality. Neither the Royal Aero Club, which is imagined to represent the sporting side, nor the Royal Aeronautical Society, as representing the scientific side, nor the Society of British Aircraft Constructors, representing the Trade, had an official representative at the meeting. As commercial aviation of the future is most certainly going to be chiefly an international affair, such a policy of apparent neglect is not likely to promote the interests of British aviation abroad.

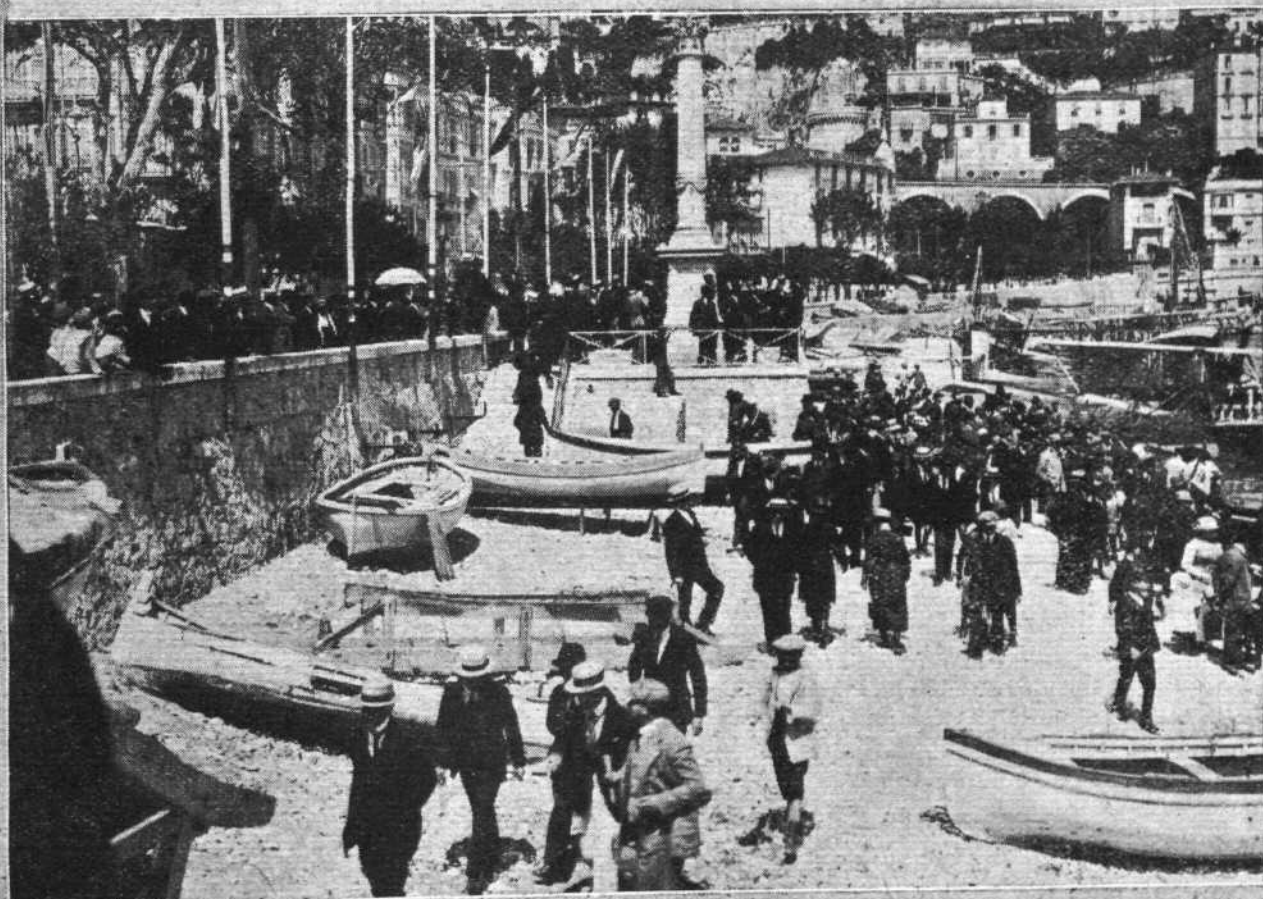
Turning now to the absence of British machines at the Monaco meeting, we sincerely regret that the only machine entered—the Fairey seaplane—was prevented from taking part. That the pilot nominated for the Fairey should have had to leave for America at the last moment is sincerely to be regretted, and the fact that this prevented the machine from taking part only goes to show that for these great international events the representation of this country should not be left entirely to private enterprise. It appears to us that one of the functions of the Society of British Aircraft Constructors would be to select a certain number of representatives, not necessarily with a view to sending them all to the meeting, but so as to have always at least one or two in reserve in case of emergency. In this manner the industry would always be well represented abroad, to the common good of all its members. If the industry is to have any hopes of surviving these difficult times, it will not do to sit down with its hands in its lap and wait for the Government to find a market for it. We know that British aircraft are second to none in the world, but if it is to be accepted that everybody will take this for granted without any demonstration, then we can foresee a very sad awakening.

## A Controversial Point Settled

The text of a Government Bill to enable effect to be given to the provisions of the Convention on Air Navigation, signed in Paris last October, has just been issued. There is a memorandum prefacing the Bill, which sets forth that it is proposed to apply the principles of the Convention not only as respects the cases to which it specifically relates, that is to say, international flying, but also to internal flying in the British Islands. The Bill is intended to repeal all the existing laws relating to air navigation, which will in future be governed entirely by the principles adopted in the Convention and applied by the present Bill.

One of the most interesting points of the Bill is that it sets at rest the old controversy relating to aerial trespass. It has been gravely argued that ownership of land extends also to the air as far up as the limit of the atmosphere. If that were accepted as a principle of law, it would of necessity follow that aircraft flying over private property would be guilty of trespass and proceedings would lie against their owners and pilots. The question has never been settled by the courts, so far as our recollection serves, probably because no one has been sufficiently pig-headed to take the necessary proceedings at law. It is a practical certainty, however, that unless the law were made absolutely clear it would not be long before litigation was undertaken by someone with a fancied grievance, and while that might be good for the lawyers it would certainly not help aviation. As a purely academic question it is interesting, but that is as far as it goes. The new Bill settles the matter, once and for all, since Clause 9 lays down that: No action shall lie in respect of trespass or in respect of nuisance by reason only of the flight of aircraft over any property or the ordinary incidents of such flight, so long as the provisions of this Act and any Order made thereunder and of the Convention are duly complied with; but where material damage or loss is caused by an aircraft in flight, taking off, or landing, or by any person in any such aircraft, or by any article falling from any such aircraft, to any person or





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**MONACO SEAPLANE MEETING :** Some idea of the beautiful surroundings in which are laid the seaplane competitions at Monaco may be gathered from the picture at the top of this page, which shows one of the terraces between the Casino and the Tir aux Pigeons. The lower photograph shows the inner end of Monaco harbour, with interested spectators examining the various flying-boats



property on land or water, damages shall be recoverable from the owner of the aircraft in respect of such damage or loss, without proof of negligence or intention or other cause of action, as though the same had been caused by his wilful act, neglect, or default, except where the damage or loss was contributed to by the negligence of the person by whom the same was suffered.

It will be noticed that the Bill does not deal with the actual question of ownership of the air, but gives a species of indemnity for its use by aircraft. It is a point that does not matter in the least, and we only mention it as a matter of passing interest.

♦ ♦ ♦

**Lord Northcliffe and the German Air Menace**

At a luncheon given last week to celebrate the first attempt to fly from Cairo to the Cape, Lord Northcliffe expressed some uneasiness at the manner in which Germany seems to be preparing for revenge by air. We do not know, he said, how far Germany has progressed since the Armistice, or how many aeroplanes she really has. It was stated in Parliament the other day that the Germans have confessed to having over 15,000 machines, but in a war book by Gen. Schwarte, entitled "Military Lesson of the Great War," the statement is made that Germany had altogether 47,000 aeroplanes. As Lord Northcliffe said, it is hardly to be believed that the Allies brought down the difference between 47,000 and 15,000. It is possible that Gen. Schwarte was writing for the sake of effect when he made his statement, but it is hardly probable, since his work is intended to be a textbook for the information of future generations of German soldiers, and to that end his information as to actual facts would necessarily be as accurate as he could make it. In any case, it will be as well if we do not fall into the error of again underestimating Germany's strength or her intentions, and we agree with Lord Northcliffe that we must watch her closely in these and other matters.

We have been warned by all the authorities who have given the subject their attention that the next war will be decided in the air. Indeed, that much is perfectly plain even to the thinking layman. The Power that has the prevision to strengthen its aerial resources beyond those of its neighbours will hold the terrible power of being able to deal a sudden and crushing blow, at its own chosen moment, almost without interference from the country attacked. Nothing can stop aggression save the knowledge that an attack from the air will bring in its train instant reprisal and three-fold punishment. We must certainly watch Germany to see that she does not become so strong in the air that she will be in a position to take aggressive action without the absolute certainty of such reprisals, and one of the first steps that should be taken is to check the figures given by Gen. Schwarte. We must find out what these 47,000 aeroplanes are of which he speaks, and whether he means that Germany actually possessed that number at the Armistice; whether the figure represents all the machines she has ever owned; or whether he

meant that the figures included all machines owned during the War, at the Armistice, and prepared material ready for erection. As a matter of fact, we do not seriously think that the figures are in fact correct, but it will be only right to make certain. To that end we hope that a question will be asked in the House in order that the matter may be cleared up as promptly as possible.

In connection with this question of air power it is interesting to follow the opinions of our leading naval and military authorities on the future of war. Before the late War a high naval authority told us that the capital ship was doomed, and that the future of marine war was with the submersible. Now we have Lord Beatty telling us that the big battleship is still the dominant factor, and will remain so for many years to come. Soldiers are divided in their opinions as to the shape land war will take. Some profess to think that it will be much as it has been. Others say that it will be a war between engineers and their mechanical devices. These varied opinions, in all their shades, open up an unending vista of controversy which will remain unsettled until the lessons of the next great war give a new trend to naval and military thought. But it is as well not to miss the significant unanimity with which all these authorities agree about the factor of air power. Not one but admits that this will be decisive, and that the Power which gets its first heavy aerial blow in will have gone far along the road to a decision. That emerges from every discussion, yet the Air Service is the one which is being rapidly starved into a state of pernicious anæmia. It will not do. We cannot allow history to repeat itself, for if we do its ultimate end will not be as that of the recent war. In this connection we cannot do better than quote Lord Northcliffe's remarks on the occasion to which we have referred earlier in this article. He said: "For a thousand years and more we regarded our position as being comparatively free from the war dangers that threatened the countries of Europe. We thought that the very small piece of sea we had around us would be our safeguard. But one Sunday morning M. Blériot arrived at Dover, and a few thinking people began to realise at once that our position was entirely changed. Unfortunately for us, most of those thinking people lived in Germany, and it was almost immediately after that that they began those continual tests at Johannisthal, where, by offering increasing rewards to airmen, they broke all flying records. The Germans are talking and writing today about revenge by air. We need not be alarmed, but we must watch them and see to our own efficiency and progress."

We are not at all alarmist, but we are a long way from being convinced that the Germany of today is anything but the old Germany with the old German ideals. It is true she is crippled for the time being, and will not be in a condition for many years to contemplate another war on the scale of the last, but when we remember how comparatively easy and how cheap it is to create a great air fleet we cannot afford to take the smallest chance.

♦ ♦ ♦ ♦ ♦

**Belgian King and Queen Fly to England.**

For their visit to England for the wedding of Lady Cynthia Curzon on Tuesday, the King and Queen of Belgium elected to come by air. They left Brussels at 11 a.m. and landed at 2 p.m. at the R.A.F. aerodrome at Farnborough, being received by General Lord Rawlinson and Vice Air-

Marshal Sir John Salmond. Three DH4 machines were used, King Albert being piloted by Lieut. Stampe, the Queen by Lieut. Crombez, and Baron Goffinet, the King's A.D.C., by Lieut. Ledure. Misty weather was experienced over the Channel, and the flight was made at an average height of 1,000 ft.



## SMALL SPORTING AEROPLANES

We have received from the Controller of Information of the Department of Civil Aviation Technical Memo. No. 13, in the form of a summary of the existing information in regard to small sporting aeroplanes of 50 h.p. and under. Inasmuch as the subject of small sporting aeroplanes is, in our opinion, a very interesting and important one, we have taken this opportunity of enlarging somewhat on the information sent us by the above Department, and thus provide our readers with a more complete reference to this type of machine. We have prepared sketches of each of the machines (with one exception), and have added to the data supplied in the table of specifications—we have also taken the liberty of slightly altering the arrangement of the latter.

The following is a list of the machines, together with their special features:—

### Monoplanes

**B.A.T. "Crow" F.K. 28 (BRITISH).**—Tractor single-seater "Demoiselle" type with 40 h.p. A.B.C. "Gnat" engine. Cantilever wings. Tail carried by two box-girder outriggers. Engine mounted on centre of wings. Pilot seated in nacelle underneath. Has flown. Messrs. British Aerial Transport Co., London, England.

**Blackburn "Sidecar" (BRITISH).**—Tractor side-by-side two-seater with 40 h.p. A.B.C. "Gnat" engine. Messrs. Blackburn Aeroplane and Motor Co., England.

**Didier "Oiseau Bleu" (FRENCH).**—A twin pusher two-seater with two 3 h.p. engines. Reported patented design of Capt. Didier of the French Army. No further particulars known.

**Farman "Moustique" (FRENCH).**—Tractor single-seater with A.B.C. "Gnat." Has flown. M. and F. Farman, Billancourt, France.

**Fokker V. 40 (GERMAN (?) DUTCH).**—Tractor single-seater with 30 h.p. Anzani engine. Parasol type, mainly of metal construction. Has flown. Fokkerwerke, Schwerin, Germany.

**Gallaudet "Chummy Flyabout" (U.S.A.).**—Twin

pusher side-by-side two-seater with two Indian motor-cycle engines mounted in the nose of the fuselage and driving the airscrews through shaft and bevel transmission gear. Gallaudet Aircraft Corp., East Greenwich, Conn., U.S.A.

**Loening "Kitten" (U.S.A.).**—Tractor single-seater seaplane with inverted Y-type three-cylindrical Lawrence (air-cooled) engine. Twin single-step floats made of aluminium. Wings braced from underneath by struts, no top bracing. Modified R.A.F. 15 wing section. Has flown. Loening Aeronautical Engineering Corp., New York, U.S.A.

**White "Sportplane" (U.S.A.).**—Tractor single-seater with 18 h.p. Indian motor-cycle engine. Wings braced by diagonal struts (underneath) to fuselage, no wires. No undercarriage or shock-absorbers, spring wheels attached directly to fuselage. George D. White Co., Los Angeles, Cal., U.S.A.

### Biplanes

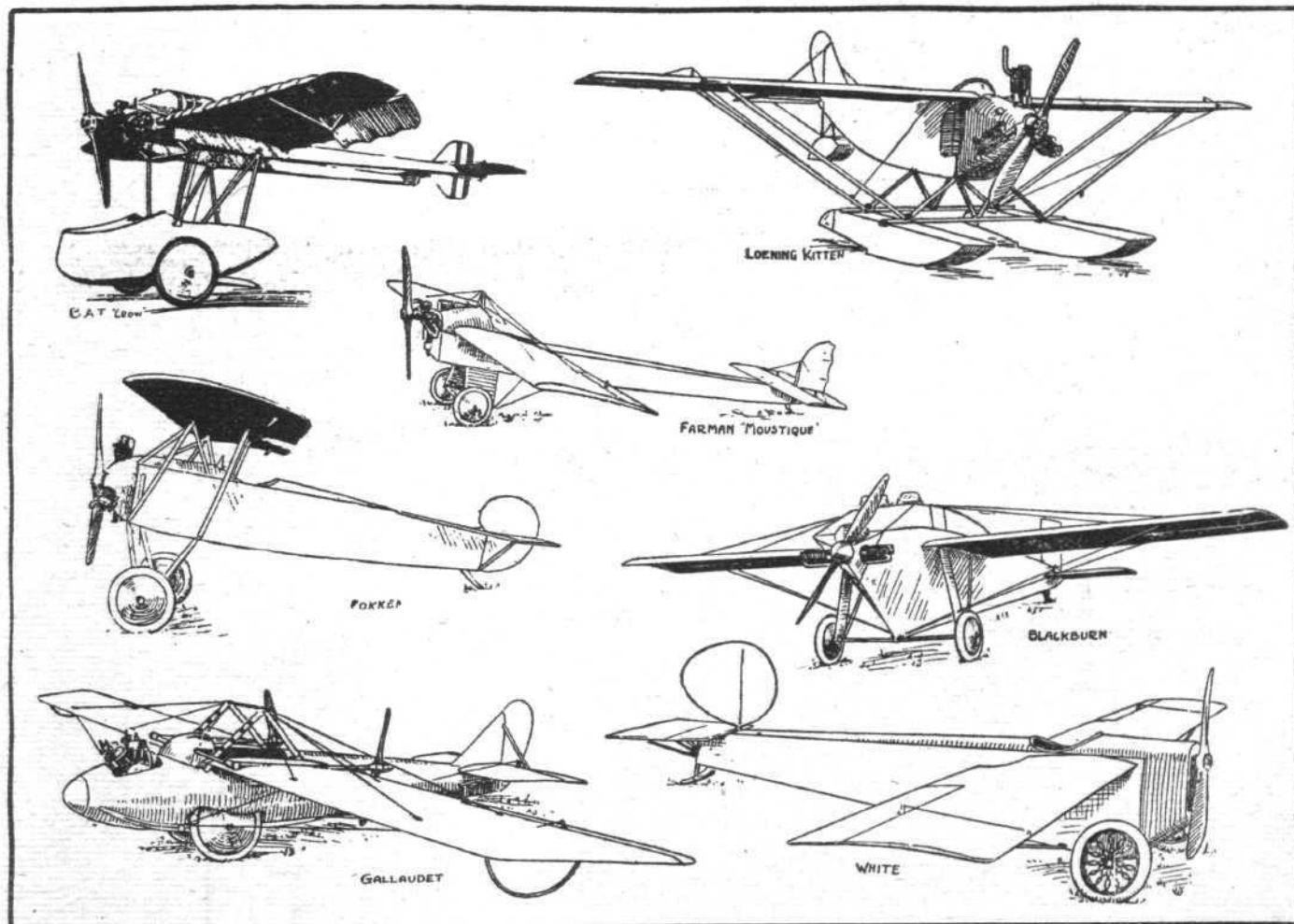
**Ace (U.S.A.).**—Tractor single-seater with 40 h.p. four-cylindrical water-cooled Ace engine. Two one-piece I interplane struts each side of the fuselage. Wheel and skid undercarriage. Has flown. Horace Kean Aeroplanes, New York, U.S.A.

**Ace "K-I" (U.S.A.).**—1920 model of above. Tractor single-seater with 40 h.p. Ace engine. Nose radiator. One I interplane strut each side of fuselage. Folding wings. Has flown. As above.

**Austin "Whippet" (BRITISH).**—Tractor single-seater with 45 h.p. Anzani engine. Mainly of metal construction, without bracing wires. Folding wings. Has flown. Messrs. Austin Motor Co., Birmingham, England.

**Avro "Baby" (534) (BRITISH).**—Tractor single-seater with 35 h.p. four-cylindrical water-cooled Green engine. Nose radiator. Has flown. Messrs. A. V. Roe and Co., Manchester and Hamble, England.

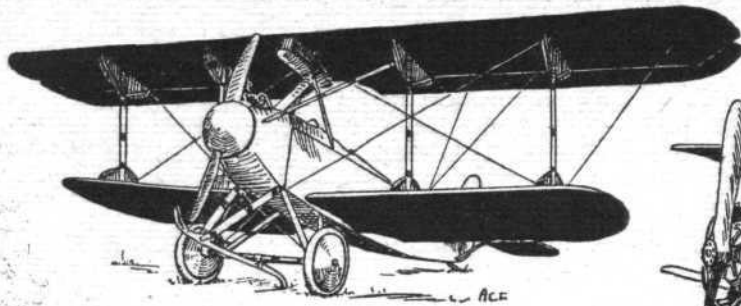
**Bellanca (U.S.A.).**—Tractor single-seater with 35 h.p. Anzani engine. Has flown. Maryland Aeroplane Co., New York, U.S.A.



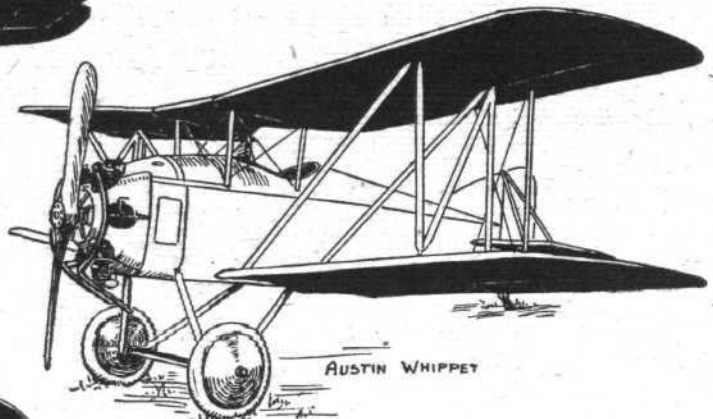
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THE SMALL SPORTING AEROPLANES: Seven types of monoplanes of British, American, French and German origin

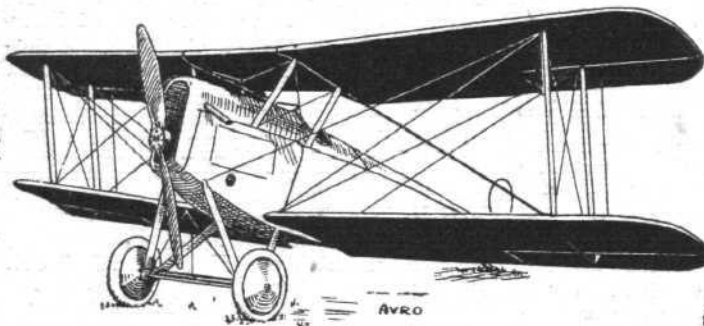




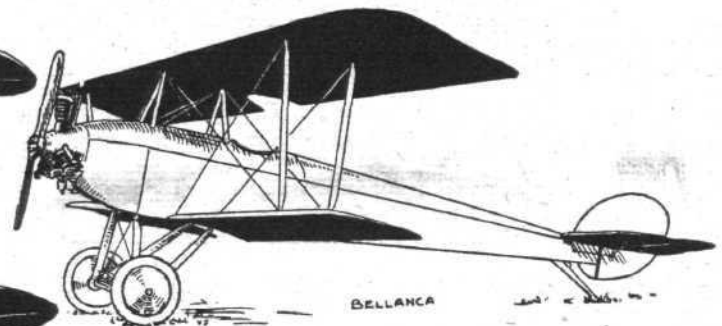
ACE



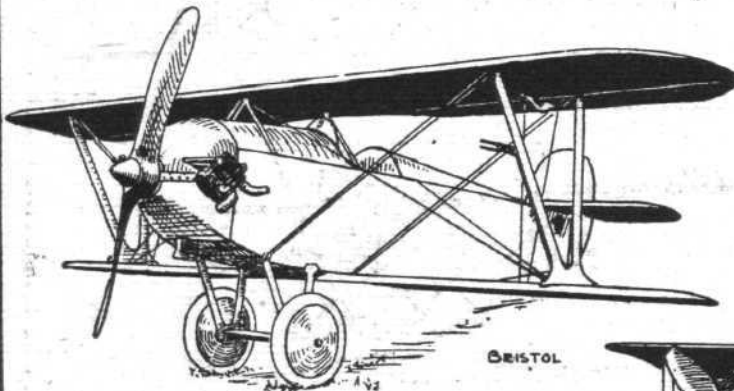
AUSTIN WHIPPET



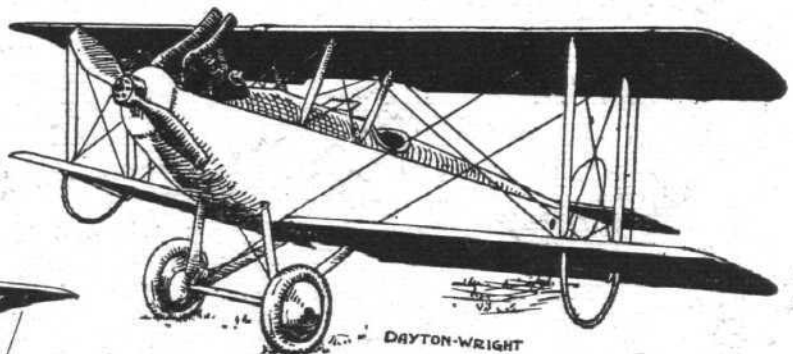
AVRO



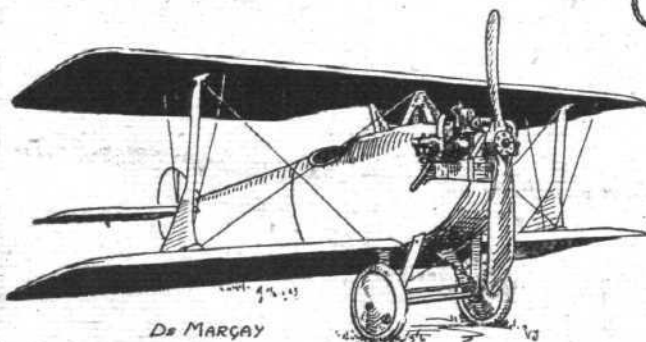
BELLANCA



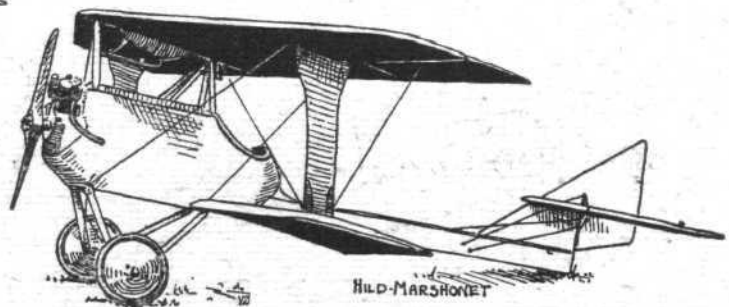
BRISTOL



DAYTON-WRIGHT



De MARÇAY

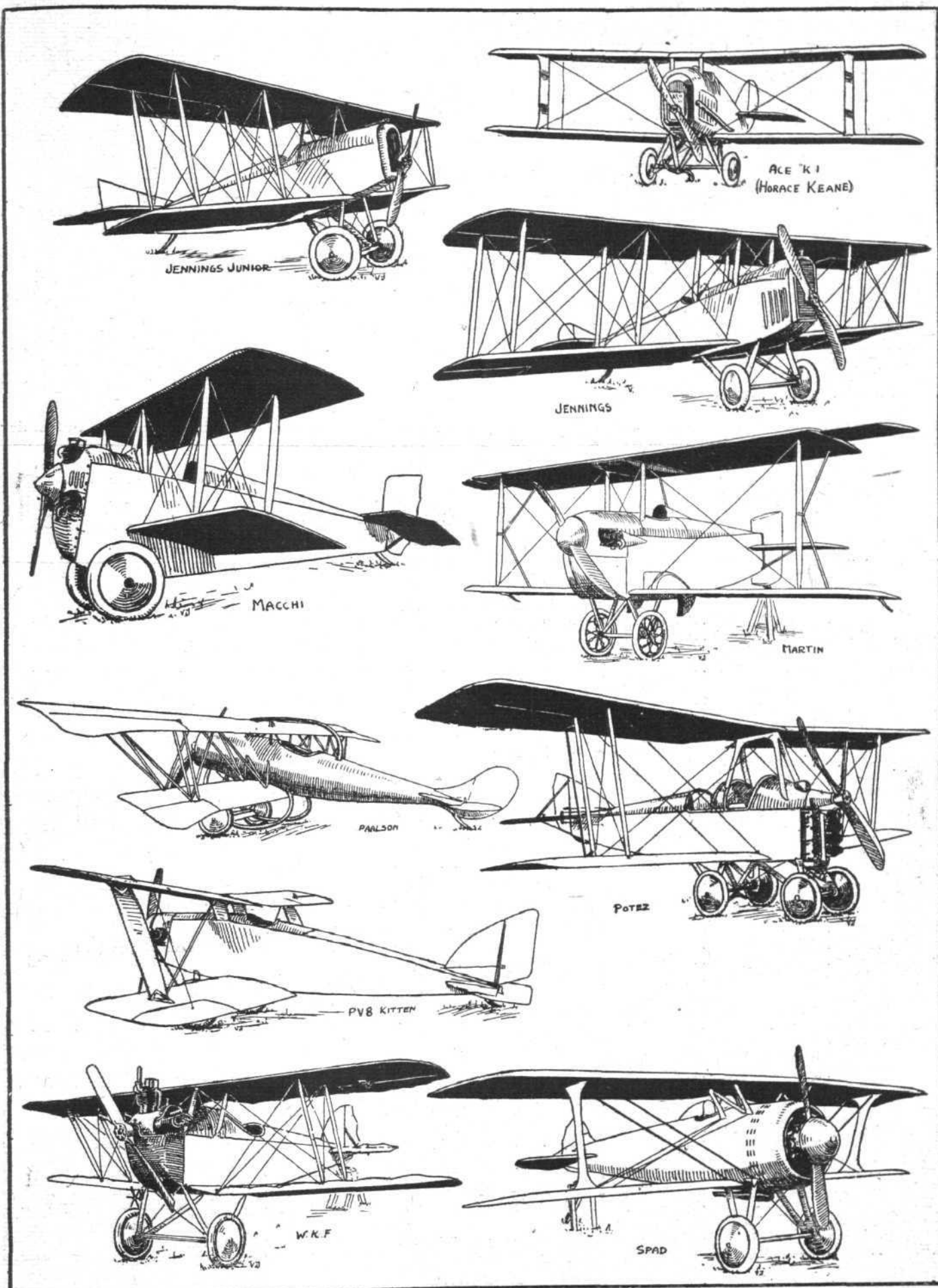


HILD-MARSHONET

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SMALL SPORTING AEROPLANES : Some representative British, American and French biplanes





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**SMALL SPORTING AEROPLANES :** Further representative British, American, Austrian, French, Italian and Swedish biplanes



**Bristol "Babe"** (BRITISH).—Tractor single-seater with 40 h.p. A.B.C. "Gnat" engine. One pair V interplane struts each side of the fuselage. Has flown. Messrs. British and Colonial Aeroplane Co., Bristol, England.

**Dayton-Wright "Messenger"** (U.S.A.).—Tractor single-seater with four-cylindered two-stroke air-cooled V-type De Palma engine. Has flown. Dayton-Wright Aeroplane Co., Dayton, Ohio, U.S.A.

**Hild-Marshonet** (U.S.A.).—Tractor single-seater with 20 h.p. Marshonet two-cylindered air-cooled engine. Top plane has the leading edge swept back, and the lower plane, which is aft of the former, is swept forward and set at a dihedral angle. Has flown. Hild and Marshonet, New York, U.S.A.

**Jennings "Junior"** (U.S.A.).—Tractor single-seater with 35 h.p. four-cylindered water-cooled Jennings (? Ford) engine.

**Jennings "Sportplane"** (U.S.A.).—Similar earlier model of above. Both are of more or less orthodox design. Jennings Machine Works, Uniontown, Pa., U.S.A.

**Macchi "16"** (ITALIAN).—Tractor single-seater with 35 h.p. Anzani or 40 h.p. A.B.C. engine. Deep fuselage, with axle and landing wheels sprung on the bottom longerons of same. Convertible to seaplane by substituting floats in place of wheels. Societa Anonima Nieuport-Macchi, Italy.

**De Marçay "Passepartout"** (FRENCH).—Tractor single-seater with 10 (?) h.p. A.B.C. engine. Single interplane struts. Has flown. Edmond de Marçay, France.

**Martin "K-3"** (U.S.A.).—Tractor single-seater with 40 h.p. A.B.C. "Gnat" engine. Embodies sundry patents of Mr. James V. Martin, e.g., wing-tip ailerons, K interplane struts, and retractable chassis. Has flown. James V. Martin Enterprises, Dayton, Ohio, U.S.A.

**Paalson** (SWEDEN).—Tractor single-seater with 50 h.p. Thulin (Le Rhone type) engine. Wings with Warren-strut bracing (no wiring) and variable angle of incidence. Has flown. Planfabriks A/B, Paalson, Sweden.

**Potez "S.E.A. 8"** (FRENCH).—Tractor two-seater with 50 h.p. four-cylindered air-cooled Potez engine. The latter is mounted with its crankshaft vertical and drives the airscrew through gearing. Metal (duralumin) construction. Four-wheeled undercarriage. Societe des Etudes Aeronautiques, France.

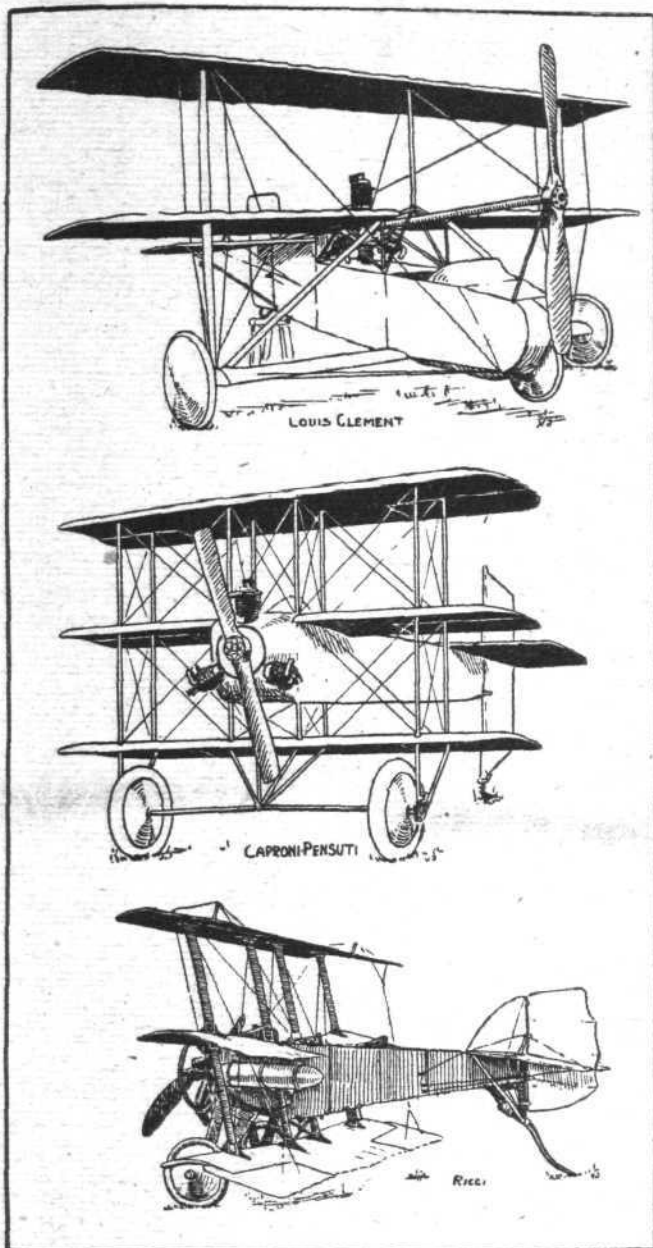
**P.V. 8 "Eastchurch Kitten"** (BRITISH).—Tractor single-seater with A.B.C. "Gnat" engine. Second of two machines. Designed by British Government as ships' plane for torpedo-boat destroyers and other small craft. Single one-piece interplane struts on each side of the fuselage. Has flown.

SMALL SPORTING AEROPLANES.—A table of the principal characteristics of machines of 50 h.p. and under.

Make	Engine	H.P.	Span.	Length.	Height.	Area	Weight.				Speed (m.p.h.)		Climb ft./min.	Ceiling (service)	Endurance.	
							Empty.	Laden.	Per sq. ft.	Per h.p.	Maxi- mum.	Land- ing.				
MONOPLANES																
B.A.T. "Crow" ..	A.B.C. Gnat ..	40	15 0	14 0	—	—	220	400	—	10	75	—	—	—	—	2
Blackburn "Side- car" *	A.B.C. Gnat ..	40	27 3	20 6	6 3	123	—	—	—	—	83	48	—	—	—	4
Didier "Oiseau Bleu"	2 x 3 h.p. ? ..	6	16 5	8 6	—	—	—	—	—	—	—	—	—	—	—	—
Farman "Moustique"	A.B.C. Gnat ..	40	11 0	—	—	80.75	220	485	6	24.25	68	—	—	—	—	—
Fokker V 40 ..	Anzani ..	30	19 8	13 1½	—	—	—	—	—	—	74½	—	—	—	—	—
Gallaudet "Chummy"	2 x 18 Indian motor-cycle	36	33 0	18 7	5 0	130	750	1,080	8.3	22.8	80	40	—	—	—	2
Loening "Kitten"	Lawrence ..	35-60	19 0	13 0	5 0	72	300	500	7	10	100	50	1,500/1	—	—	2
White "Sport-plane"	Indian motor-cycle	18	23 0	14 0	—	—	200	390	—	21.6	50	—	—	—	—	3
BIPLANES																
Ace ..	Ace (w.-c.) ..	40	28 4	16 1	—	—	600	825	—	20.6	60	30	3,000/10	—	—	2½
Ace "K-1"	Ace (w.-c.) ..	40	25 0	19 6	8 0	185	—	832	4.5	20.8	80	30	—	—	—	—
Austin "Whippet"	Anzani ..	45	21 6	16 0	7 6	134	500	730	5.44	16.21	95	30	6,500/6	—	—	2
Avro "Baby"	Green ..	35	25 0	17 3	7 6	180	607½	844½	4.69	24.1	704	30	10,000/14	—	—	3½
Bellanca ..	Anzani ..	35	26 0	17 7	7 0	150	400	775	5.2	22.1	85	34	800/1	—	—	—
Bristol "Babe"	Siddeley ..	40	19 8	15 0	5 9	108	460	683	6.92	12.2	806	40	—	—	—	2½
Dayton-Wright "Messenger"	De Palma ..	37	19 3	17 6	6 1	106	476	646	6	17.4	85	37	3,000/10	—	—	3
Hild-Marshonet	Marshonet ..	20	24 0	19 0	7 0	160	450	700	4.37	35	65	35	1,600/1	—	—	—
Jennings "Junior"	Jennings ..	35	28 0	16 3	8 0	—	340	580	5.9	13.71	74	37.5	6,500/10	—	—	4
Jennings "Sport-plane"	Jennings ..	35	28 0	18 11	8 1	206	450	675	3.2	19.2	85	30	—	—	—	2
Macchi "16"	Anzani ..	35	19 8	13 9	—	129	353	562	4.63	16	74½	40	—	6,500	—	2
Macchi ..	A.B.C. Gnat ..	40	19 8	13 9	—	129	353	562	4.63	14.05	84	—	—	10,000	—	3.7
De Marçay "Passepartout"	A.B.C. ..	10	13 3	12 5½	4 6	91.5	230	417	4.5	41.7	68	—	—	3,300	—	—
Martin "K-3"	A.B.C. Gnat ..	40	17 11	13 4	7 4	103.6	350	570	5.5	12.7	1356	—	6,500/3	—	—	—
													10,000/6	—	—	—
Paalson ..	Thulin rotary	50	26 3	18 8	7 6½	—	705½	1,102	—	22.04	81	—	—	—	—	—
Potez "S.E.A. 8" *	Potez ..	50	26 3	18 5½	6 6½	206.6	485	962	4.48	18.52	—	—	—	—	—	3
P.V. 8 "Eastchurch Kitten"	A.B.C. ..	30	19 0	15 7	5 2	106	358	648	6.1	20.25	92d	34½	6,500/12	(?) 12,500	—	1½
													10,000/23	—	—	—
Spad "S. 30"	Anzani ..	45	23 5	19 6	7 4	—	573	882	—	19.6	87	37	—	—	—	3
W.K.F. ..	Hiero ..	35	17 8½	14 5	6 10	100	364	747	7.4	21.34	81	—	—	—	—	10
TRIPLANES																
Caproni "Pensuti-2"	Anzani ..	35	13 1	12 5½	7 10½	—	—	507	—	14.49	62	25	3,000/15	—	—	—
Louis Clement	Anzani ..	35	18 0½	13 1	—	142	—	551	3.88	15.74	—	—	—	—	—	—
Ricci "R-6"	Anzani ..	40	11 6	12 3½	7 2½	118	330½	661	5.6	16.5	68	25	—	—	—	4

\* 2-seater. a 67 at 3,000 b 65 cruising. c 112 at 10,000. d 85 cruising; 88½ at 3,000; 85 at 10,000.

Note.—The A.B.C. engine fitted in a number of the above machines is variously stated as 20, 30 and 40 h.p., but they all appear to be the "Gnat" engine run at different r.p.m.



SMALL SPORTING AEROPLANES: The triplanes

## AVIATORS AS DESPATCH CARRIERS

LECTURING on "Imperial Aspects of Aviation," before the Royal Colonial Institute, Lieut.-Col. Lockwood Marsh, Secretary of the Royal Aeronautical Society, said that, generally speaking, he believed that, from the political and "staff" point of view, aircraft would in the future have uses somewhat analogous to those of the submarine cable. Important despatches would be carried between all parts of the Empire by air.

The great difficulty of locating some of the German commerce raiders during the war showed that it would be practically impossible to prevent aerial communication between the component parts of the Empire. It was from this point of view that the establishment of the Imperial commercial air routes was so important. There should be a chain of aerodromes and airship stations on British territory throughout the world, exactly as there were coaling stations for the Fleet.

### A Blériot Safety Prize

M. LOUIS BLÉRIOT has offered to the Aero Club of France a sum of 100,000 francs for a prize to encourage research with a view to improving the safety of aeroplanes. The aviation committee of the Club is now busy drawing up the rules for the competition for the Coupe de Sécurité Blériot.

### "447 Miles an Hour"

RECENTLY some French papers have published notes regarding an incident to the French pilot Weiss during an attack on the height record on March 19, and based on them some misleading paragraphs have been telegraphed to

**Spad "S (?)H 30" (FRENCH).**—Tractor single-seater with 45 h.p. Anzani engine. Single I interplane struts. *Mono-coque fuselage*. Exhaust led through silencer below the fuselage. Has flown. Blériot Aeronautique, France.

**W.K.F. "Klenflugzeug" (AUSTRIAN).**—Tractor single-seater with 35 h.p. Hiero three-cylindrical air-cooled "Fan"-type engine. Wiener Karosserie und Flugzeugfabrik, Austria.

### Triplanes

**Caproni "Pensuti-2" (ITALIAN).**—Tractor single-seater with 35 h.p. Anzani engine. Rectangular fuselage mounted to and below middle plane, *ailers* on all three planes. Planes supported by one pair of interplane struts each side of the fuselage and two pairs at the latter. Wide landing-chassis. Has flown. Società per Lo Sviluppo Dell'Aviazione in Italia, Italy.

**Louis Clement (FRANCE).**—Tractor single-seater with 35 h.p. Anzani mounted behind the main planes and driving the airscrew through a tubular shaft. Pilot in nose of fuselage in front of main planes. Planes separated by a single "straight through" interplane strut on each side of the fuselage, and one tubular strut at the fuselage. Metal construction. No under-carriage, wheels attached direct to and sprung inside lower plane. Etablissements Louis Clement, France.

**Ricci "R-6" (ITALIAN).**—Tractor single-seater with 40 h.p. Anzani (radial) engine. Single I interplane struts on each side of the fuselage and two at the fuselage. Balanced *ailers* top and bottom planes. Has flown. Società Industriale Aviatrice Meridionali, Italy.

In addition to the foregoing, a small school biplane, with a 50 h.p. Gnome, not unlike the Nieuport without the V interplane struts, was built by the Garbardini Co. of Italy, and a small biplane flying-boat, with a 40 h.p. A.B.C. Gnat, has also been designed by the Gosport Aircraft Co., but has not, we believe, been built.

There are, of course, several other makes of machines that, strictly speaking, come within the category of small sporting aeroplanes, but inasmuch as they are fitted with engines of over 50 h.p., they have not been included here. We refer to the Farman "David" (biplane, 60 h.p. Le Rhone), Grahame-White "Bantam" (biplane, 80 h.p. Le Rhone), L.W.F.-Cato "Butterfly" (monoplane, 60 h.p. Cato, 2 cyl. horizontally opposed air-cooled) and Cato "Sportplane" (Parasol monoplane, 60 h.p. Cato). All these machines have been described in previous issues of FLIGHT. Full detailed descriptions, with scale drawings, of the G.-W. "Bantam" and the Cato "Sportplane" being published in the issues for April 10, 1919, and October 9, 1919, respectively, whilst particulars and illustrations of the Farman "David" appeared on December 25, 1919, and January 8, 1920, and of the L.W.F.-Cato on April 1, 1920.

After discussing the value of the airship in settling tribal disputes and carrying out punitive expeditions, the lecturer said that the French Army airship pilots during the war carried out 63 raids over the German lines, during which they only lost two airships, although the craft used were only capable of descending a little over 12,000 ft.

The real value of commercial aircraft, from the Imperial point of view, lay in their capacity for bringing closer together the various units of which the Empire was composed. This was a question not merely of improved mail facilities, but also of actual human intercourse. For example, it was impossible for many whose business lay in the home country to spare the time for a long sea voyage or overland journey to and from one of the distant Colonies. If people were able to get about more and to see one another's difficulties at first hand, they would inevitably be brought closer together.

England. The facts are that during a lecture before the French Academy of Science on March 24, M. Rateau mentioned that M. Weiss, on reaching 8,000 metres, found that he had insufficient oxygen. Realising his danger he cut off the ignition, and started to make a rapid descent. At the commencement, M. Weiss estimated his speed at 200 metres per second, and his barograph showed that the machine had dropped 2,800 metres in 14 seconds, representing a speed of 720 kiloes per hour (447 m.p.h.). The pilot reached the ground safely, but his machine was badly damaged, the *ailers* being carried away and several wires broken.



## HONOURING "THE TIMES" FLIERS

LORD NORTHCLIFFE presided at a luncheon given at Printing House Square on May 7 in celebration of the attempt, organised by *The Times*, to make the first flight from Cairo to the Cape. Those sitting at the Chairman's table included—Dr. P. Chalmers Mitchell, C.B.E., F.R.S., who made the journey in the dual capacity of a representative of *The Times* and of a scientific observer; Capt. S. Cockerell and Capt. F. C. Broome, D.F.C., the pilots; and Sgt.-Maj. James Wyatt and Mr. Claude Corby, the mechanic and rigger. It will be recalled that the Vickers-Vimy-Rolls-Commercial aeroplane in which the party travelled left the aerodrome at Brooklands on January 24 and crashed at Tabora on February 27, after a series of undeserved misfortunes. Among those present were Maj.-Gen. Sir F. H. Sykes, Maj.-Gen. Sir Edward Northey, Commander Sir Trevor Dawson, R.N., Air-Commodore E. M. Maitland, C.M.G., D.S.O., Wing-Com. H. A. Van Ryneveld, D.S.O., M.C., Flight-Lieut. C. I. Q. Brand, D.S.O., D.F.C., M.C., Sir Robert Coryndon, Brig.-Gen. G. Livingston, C.M.G., Lieut.-Col. W. O. Raikes, Sir W. Joynson-Hicks, M.P., Sir Alan Anderson, Sir Francis Barker, Sir Vincent Caillard, Sir William Towle, Sir George Sutton, Sir Campbell Stuart, K.B.E., Sir Andrew Caird, Brig.-Gen. W. B. Caddell, Mr. Douglas Vickers, M.P., Col. Beatty, Mr. A. C. Hollis, C.M.G., O.B.E., Maj. G. H. Scott, A.F.C., Mr. R. A. Blankenberg, O.B.E., Mr. Handley Page, Mr. Frederic Coudert, Mr. Max Pemberton, Mr. L. J. Maxse, Mr. A. Hunt, Capt. P. D. Acland, Mr. Herbert Kaufman, Mr. T. Marlowe, Mr. R. K. Pierson, M.B.E., Mr. A. Butes, Mr. John Walter and Mr. H. Wickham Steed.

In proposing the toast of Dr. Chalmers Mitchell and the pilots and mechanics of *The Times* aeroplane, Lord Northcliffe said: "Since I first flew the aeroplane has developed from a point where a 20 h.p. engine raised one man 30 ft. or 40 ft. to the great machines whose Rolls-Royce engines enables people to fly to Australia and across Africa.

"Yet we have only begun to develop flight, and I am once again beginning to be anxious as to our position in regard to aviation. I do not think we know how far Germany has gone since the armistice, or how many aeroplanes she really has. Are we certain of our facts in regard to Germany's aerial position? It has been stated in Parliament that the Germans have confessed to having over 15,000 machines. But I have been looking into German war books lately, and I find that General Schwarte in an interesting volume called 'Military Lessons of the Great War,' says that they had altogether 47,000 aeroplanes. I cannot believe it possible that the Allies brought down the difference between 47,000 and 15,000. We must watch Germany closely in this and other matters. We do not fully realise that the quickest way of going to war in the future will be by the use of air machines. It is only quite lately that we knew how far the Germans had gone in aviation before the War.

"It is obvious that the writings of German military authors since the War that they are pledging their faith in the future to the air. Surely it is probable that a war of the future is likely to be a land war of tanks, accompanied by aeroplanes, and at sea a war of submersible ships, also accompanied by aeroplanes. We seem to be still spending an immense amount of money on military equipment and establishments.

More money should be devoted to the air—principally to civilian aviation. Professor Chalmers Mitchell truly says that if we develop civilian air work it will be quite easy, in the event of another war, to transfer the men to military occupations. We did it with great success in the case of the officers of our mercantile marine, and I agree with him that aviation should be continually put to the hard test of commercial success. That test will eliminate faults in design and of construction as speedily as did the War.

"Britons should be particularly interested in the development of air work. The intervention of the aeroplane has changed the position of this country more than that of any country in the world. For a thousand years and more we regarded our position as being comparatively free from the war dangers that threatened the countries of Europe. We thought that the very small piece of sea we had around us would be our safeguard. But one Sunday morning M. Blériot arrived at Dover, and a few thinking people began to realise at once that our position was entirely changed.

"The Germans are talking and writing today about revenge by air. We need not be alarmed, but we must watch them and see to our own efficiency and progress."

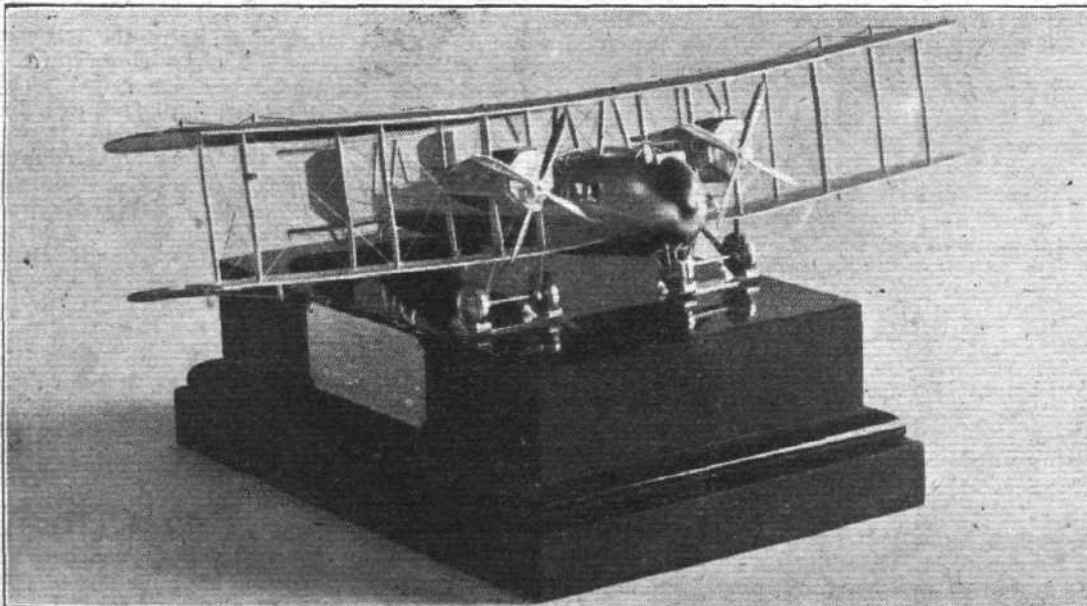
Lord Northcliffe then handed to Dr. Chalmers Mitchell a model in silver of the Vickers-Vimy in which the great flight was made, and a smaller model was handed to each member of the expedition.

Dr. Chalmers Mitchell, in reply to the toast, said that it was a joint effort they were celebrating, and they ought to remember the effort of the Air Ministry. The Air Ministry had the vision to see that the next great stage in the development of the Empire, and in the future of flying, was the surveying and opening up of the Cairo to Cape route.

After thanking *The Times* for their enterprise, and Vickers, the Handley Page and Airco firms for their assistance, he went on:—

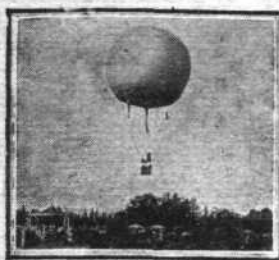
"Let me say a word now about the immediate results of our effort. In the first place, it has shown the enormous possibilities that the aeroplane already possesses for scientific exploration, particularly from the point of view of physical geography and of geology. When you are up in the air you get a view of a large tract of country, and understand things that are impossible to understand from mere observation from the surface of the earth. It was not a question really of bits of luck, such as our discovery of the volcanic area north of Khartum, although this has explained a number of the main features of the physical geography of North Africa which were hitherto unknown. It is not only that, but you have an opportunity of seeing the general lie of the country, the strike of geological forces, and of understanding a very large number of physical features which are impossible to understand in any other way."

In proposing the health of the Chairman, General Northey said: "In a small campaign I was conducting in Nyasaland and into German East Africa I was first told that aeroplanes would be useless in the wilds of Central Africa, but very soon General Smuts got them out and passed a squadron over the heads of the enemy to me at the north end of Lake Nyasa, and they were invaluable."



The silver model, to scale, of the Vickers-Vimy-Rolls aeroplane presented to Dr. Chalmers Mitchell by *The Times* to commemorate the first attempt to fly from Cairo to the Cape. Four smaller models of the machine were presented to the pilots and mechanics, Capt. S. Cockerell, Capt. F. C. Broome, D.F.C., Sergt.-Major James Wyatt, and Mr. Claude Corby. All these beautiful models are the work of the Goldsmiths and Silversmiths Company of Regent Street





# AIRSHIPS



## RIGID AIRSHIPS AND THEIR DEVELOPMENT\*

BY J. E. M. PRITCHARD, M.A., F.G.S.

### Advance Summary

In the introduction the general scope of the paper is defined, the accepted functions of both military and commercial rigid airships are outlined and the divergence between the two types briefly indicated.

The paper then discusses the three main parts of rigid airships.

### Hull

- (1) General changes in the hull structure during recent years.
- (2) The various factors governing the form of the hull.
- (3) The effect of size on performance.
- (4) Speed.
- (5) Development of the present type of internal keel, and the arrangement of fixed and disposable weights.
- (6) Fins and planes and their effect on dynamic lift.

### Fabric

- (1) Rigid outer cover requirements.
- (2) Gasbags and their probable development.

### Cars

- (1) General car arrangements.
- (2) Car suspensions.
- (3) Power units.
- (4) Engine requirements.

The paper concludes with a brief outline of airship achievements during the War, and indicates the lines along which increase in performance will be obtained.

### Introduction

This paper has been prepared as a continuation to the very interesting general airship paper read before the Royal Aeronautical Society by Wing-Comdr. T. R. Cave-Brown-Cave. An attempt has been made not so much to describe in detail the various parts of a rigid airship as to discuss along broad lines the underlying requirements and problems and the difficulties facing future development. It is hoped that this paper will also serve as an introduction to further papers dealing with specialised parts of the general subject "Rigid Airships," such as mooring, fabric, machinery installations, etc.

When considering problems connected with future technical development, it is in the first instance necessary to realise clearly the scope and functions of the operational requirements, and thus to provide a sound basis from which to start. The first problem to consider in this connection is the difference between military and commercial requirements. The chief military functions of the rigid are extended and fast patrol, convoy and scouting duties. The commercial function is rapid long-distance transport. The question of the amount

of present and future divergence between military and commercial rigids is also of the greatest importance. The commercial airship has not yet been developed at all in this country, and only to a limited extent in Germany. There is no doubt that in time the commercial rigid will differ materially from the military rigid, though probably not to the same extent as warships differ from merchant craft. For the next four or five years, however, the two types of rigids will only diverge from their common point of origin to such a very limited extent that either type will be readily and rapidly convertible from one to the other.

The Air Ministry, appreciating that the information acquired during the War by the expenditure of public money should now be available for furthering the pursuits of peace, has kindly allowed much information of an official nature to be included in this paper.

### Hull

Of the three main parts of a rigid, namely, the hull structure, the propelling machinery, and the fabric items, such as the outer cover, gasbags, etc., the hull structure is at the present time by far the most satisfactory from an operational standpoint.

The construction of the hull, and the functions of its component parts, have already been discussed by the Royal Aeronautical Society, and it is, therefore, proposed to devote this part of the paper to an examination of such problems as the streamline form of the hull, speed, endurance and weight-carrying capacity, the effect of size on performance, etc. The blunt tail and the length of the parallel portion and large stabilising area are particularly noticeable in the early types. Great strides were made by the Germans when they evolved the 33 class streamline form; its main characteristics are a very fine tail, short parallel portion, and small stabilising area. The length diameter ratio of this form is 8 compared with 10 for the parallel-sided 23 class.

### Form

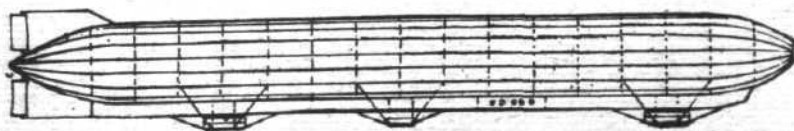
The head resistance of an airship of a given capacity can, broadly speaking, be considered under three heads:—

- (1) The small portion due to and proportional to the area of the maximum cross section of the hull.
- (2) The large portion due to skin friction of the hull and proportional to the surface area.
- (3) Appendage resistance, or resistance of the fins, cars, external wires, struts, etc.

Naturally, the greater the diameter of the hull in proportion to its length the smaller will be the surface area for a rigid of a given capacity, and consequently the resistance to its passage through the air due to skin friction will be reduced; on the other hand, the portion of head resistance due to cross-sectional area will be increased. There is, therefore, a point at which the combined resistance due to these

\* Paper read on February 4 before the Royal Aeronautical Society. The slides are published by permission of the International Film Service Co.

— RIGID AIRSHIP "23" CLASS —

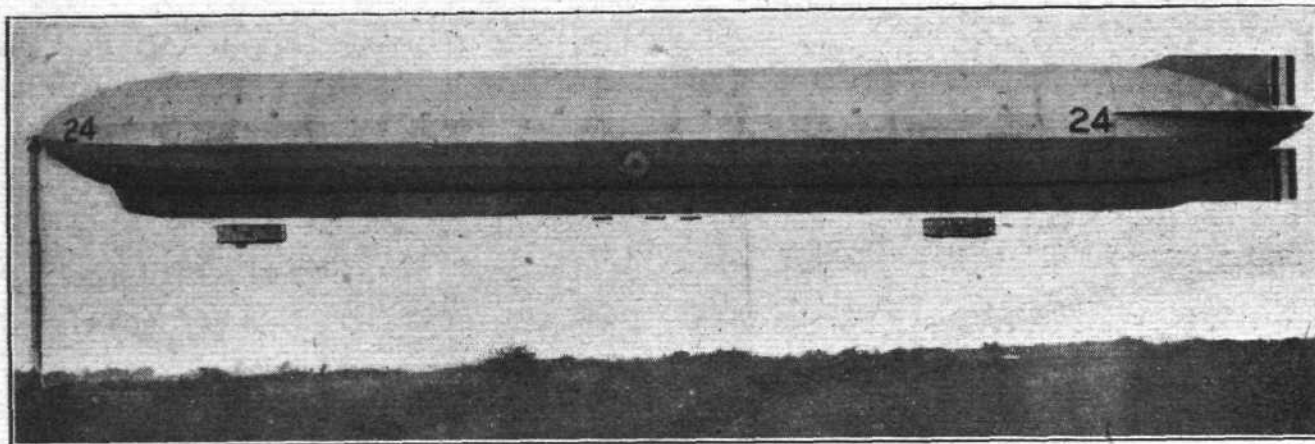


— RIGID AIRSHIP "33" CLASS —



Rigid development: (a) Side elevation, R 23 class; (b) Side elevation, R 33 class





Side view of R 24 at mooring-mast

two conflicting causes will be a minimum. This point appears to be reached with hulls of a length/diameter ratio of about 6. Although the size of the hull is large compared with the size of the various appendages, wires, struts, etc., which are considered under the general head of appendage resistance, nevertheless, this resistance is, for the early parallel-sided rigids, in the order of 40 per cent. of the total combined resistance of the airship, and for modern rigids in the order of 30 per cent. It will, therefore, be seen that very careful attention must be given to reducing, by every possible means, the parasitic resistance as well as to improving the streamline form of the hull.

The form of the hull of a rigid airship must be a compromise. The smaller the length/diameter ratio, or the more nearly spherical the form, the lighter will be the structure. On the other hand, after a certain point, *i.e.*, wherever the ratio length/diameter is less than about 6, the higher will be the head resistance and the greater will be the weight of the machinery necessary to drive the airship through the air at a given speed.

From these two considerations the following axiom can be developed:—The longer the distance a rigid of a given size is required to fly, *i.e.*, the greater the percentage of its disposable lift needed for fuel, the greater will be the economy in obtaining a true streamline form with low head resistance even at the expense of a certain amount of lift. On the other hand, if an airship is only required to fly a short distance, the greater weight-carrying capacity more than offsets the greater fuel consumption of the short ship of large diameter.

#### Size

The effect of size on performance is of fundamental importance, and has a marked bearing on all future development.

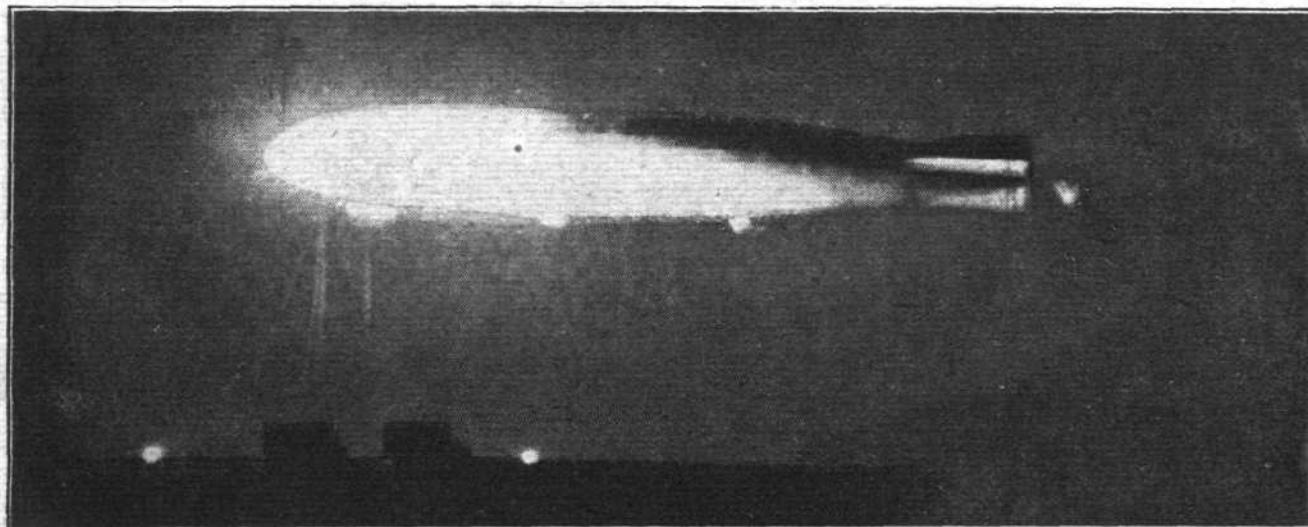
In airships of similar form, but of different size, the total lift varies as the (linear dimensions)<sup>3</sup>, being proportional to the total volume of the gas contained in the gasbags. This should be clearly distinguished from the lift of an aeroplane which is proportional to the area of the wing surfaces and therefore varies as the (linear dimensions)<sup>2</sup>, while with

airships, as already stated, the lift varies as the (linear dimensions)<sup>3</sup>.

Generally speaking, with increase in size, the weight of such items as fins and planes increases more or less proportionately to the volume. The hull structure fabric and cars, however, can be confidently predicted to increase in weight with increase in size at a rate distinctly less than the (linear dimensions)<sup>3</sup>. The remaining item, however, the propelling installation, shows the most marked percentage saving in weight in proportion to increase in size. This is a matter of great importance as, in a rigid of 2,000,000 cub. ft. capacity and maximum speed 80 m.p.h., the weight of the propelling installation is as much as one-third of the total fixed weight of the ship.

The head resistance of an airship, and consequently the h.p. necessary to drive it through the air at a given speed, is roughly proportional to the (linear dimensions)<sup>2</sup>. It therefore follows for a given speed that with increase in size the ratio weight of machinery/gross lift only increases as the (linear dimensions)<sup>-1</sup>, in other words, inversely as the linear dimensions. Besides this very material saving in percentage weight of the machinery installation with increase in size, a corresponding economy in petrol consumption is attained, which is of far greater importance, as in the large modern rigids the petrol capacity is well over five times as great as the total machinery weights. This definite improvement in performance with increase in size does not allow for a still further probable improvement, which can be predicted with the greatest confidence due to general refinements in design and more skilful use of materials.

This gain in performance with increase in size is shown practically in the accompanying table by comparing the range of a 10,000,000 cub. ft. capacity rigid with a similar ship of 2,000,000 cub. ft. capacity. In both cases a disposable lift of 60 per cent. and a maximum speed of 75 m.p.h. have been arbitrarily assumed. Even though the gain in range at a constant speed of the 10,000,000 cub. ft. ship is very marked in the example, a still further gain would be obtained in practice by the larger ship because it would actually possess a larger percentage of disposable lift than the small ship.



R 34 moored at Mineola on the three-wire system at night. Side view

PERFORMANCE TABLE

	Rigid of 2,000,000 cub. ft. Capacity.	Rigid of 10,000,000 cub. ft. Capacity.
Length .. .. .	645 ft.	1,100 ft.
Diameter .. .. .	79.5 ft.	135.5 ft.
Gross lift (at 68 lbs./ 1,000 cub. ft.) ..	60.7 tons	303.6 tons
Disposable lift (60 per cent. gross lift) ..	36.4 tons	182.2 tons
Crew, ballast, food, etc. (15 per cent. gross lift) .. .. .	9.1 tons	45.5 tons
Dischargeable lift (45 per cent. gross lift) ..	27.3 tons	136.6 tons
Maximum speed ..	78 m.p.h.	78 m.p.h.
70 m.p.h. (normal full speed)—		
* Maximum range ..	$\begin{cases} 67.9 \text{ hours} \\ 4,125 \text{ naut.} \\ \text{miles} \\ 4,750 \text{ stat. miles} \end{cases}$	$\begin{cases} 115.5 \text{ hours} \\ 6,950 \text{ naut.} \\ \text{miles} \\ 8,000 \text{ stat. miles} \end{cases}$
† Horse-power developed ..	1,700	5,000
45 m.p.h. (comparison speed)—		
* Maximum range ..	$\begin{cases} 218 \text{ hours} \\ 8,530 \text{ naut.} \\ \text{miles} \\ 9,820 \text{ stat. miles} \end{cases}$	$\begin{cases} 364 \text{ hours.} \\ 14,200 \text{ naut.} \\ \text{miles} \\ 16,400 \text{ stat.} \\ \text{miles} \end{cases}$
Horse-power developed ..	530	1,580

If the question of streamline form and size of ship is studied from the point of view of carrying with the utmost economy unit weight unit distance at unit speed, it will be found that the greatest economy is effected if a ship is designed with the most perfect streamline form available and of such size that the normal range of the ship is a little over twice the distance between the two termini between which it is proposed to fly, allowance being made when estimating the normal range for the necessary safety margin of fuel.

It can, therefore, be stated definitely that for Service requirements, where high speed and high performance are of the greatest importance, the most perfect streamline form available is required, and that the size of the ship will vary according to the performance required. For commercial airships the same also applies, and the best possible streamline form should be used whatever the variation in distance between the termini, the factor to be varied being the size and not the form of the ship.

These axioms are, of course, only general, and may be modified to a certain extent: for example, when the housing sheds are not of sufficient size and the ships have to be modified from the ideal streamline form to get the best performance out of, for example, a low shed. In general, the cramping effect of too small housing sheds has been very acutely felt, and has tended towards the production of rigids with a large amount of parallel portion.

Unfortunately, the question of streamline form is one of considerable difficulty, and although many experiments have been carried out in wind tunnels, owing to the very large scale difference between the actual ship and the model, the data obtained is at present of a vague and somewhat unsatisfactory nature. Recent results, however, are most encouraging. Up to a short time ago the R 33 streamline form, a copy of the German L 33 form, was considered about as efficient as could be obtained and far in advance of the previous parallel-sided ships built by the Germans and by this country. Certain changes in streamline form have, however, been instituted in R 38 design, whereby it has been found possible to increase the lift by about 6 tons more than if the ship had been of the 33 streamline form with only a very small increase in weight of structure and without, it is hoped, appreciably increasing the head resistance. If this proves to be the case, the advantage is obvious. There is now every reason to believe that a streamline form of appreciably lower length/diameter ratio can be developed with an even lower head resistance than that of the R 33 streamline form, this ratio being reduced from 8 to 6, or even lower.

† It is possible at the present time to construct ships of the R 33 streamline form with an efficiency ratio, i.e., disposable lift/gross lift, of some 60 per cent. and a maximum speed of

\* Fuel and oil consumption has been taken on the basis of .53 lb. per brake horse-power hour.

† Thrust horse-power has been taken as equal to 70 per cent. of brake horse-power of full speed, and 60 per cent. at 45 m.p.h.

over 75 m.p.h. for ships of under 2,500,000 cubic ft. capacity. If the experimental model results are justified and a streamline form is obtained of equally low or lower head resistance with a length/diameter ratio of 6 or under, it is quite reasonable to suppose that the ratio disposable lift/gross lift can be increased to nearly 70 per cent. without loss of speed or range. These theories appear to be confirmed by fact in the case of the German commercial airship the "Bodensee," which appears to be of far more dumpy outline than the 33 streamline form, and as far as her weight-carrying capacity, range and speed are concerned, having regard to her very small size, appears to have the highest performance of any rigid yet built.

### Speed.

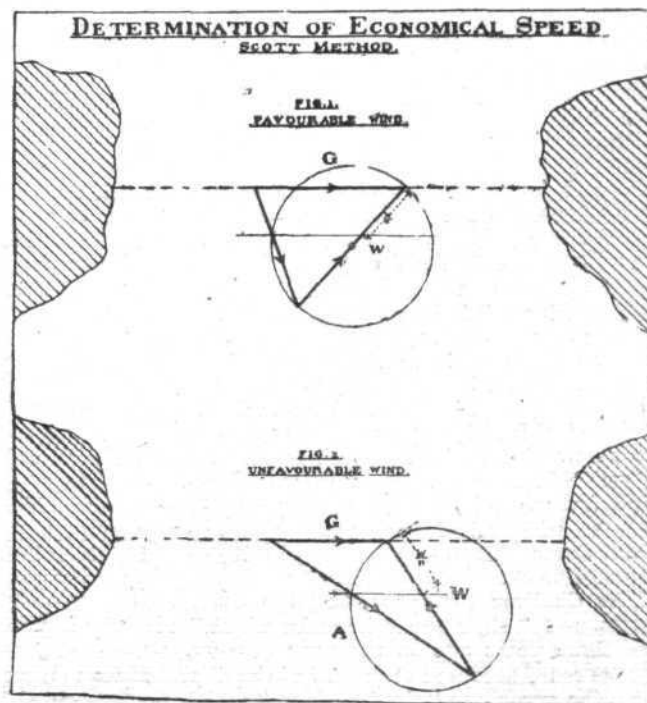
The speed for any given airship is proportional to the (horse-power)<sup>1/4</sup>. The machinery weights are proportional to the horse-power and the speed is, consequently, proportional to the (machinery weights)<sup>1/4</sup>. A point, therefore, is rapidly reached at which it is no longer practical to increase the speed of the ship, owing to the large reduction in disposable lift per unit increase in speed. A reasonably high speed, in the order of 80 m.p.h., is, however, essential because the whole justification for the use of airships is, in the case of Service requirements, rapid and extended reconnaissance and patrol duties, and for commercial purposes reliable and fast transport over long distances.

Naturally, it is of the greatest importance to obtain a streamline form of particularly low head resistance when speeds of over 40 m.p.h. are required. A reasonable amount of speed is also an economy, taking into consideration adverse winds, since, in practice, a ship with a large reserve of speed can be flown between any two points at a given speed with a smaller safety allowance of spare petrol than a low speed ship, when the given speed is nearly her maximum speed. Up to a point the smaller safety margin of petrol necessarily counterbalances the dead weight of the extra machinery. Very much greater reliability is also achieved in the event of one or more engines breaking down.

There are several important speeds which can with advantage be defined:—

(1) The speed below which it is impracticable to fly, owing to the necessity for jettisoning ballast. This speed varies according to weather conditions. In the mornings and evenings, owing to superheating effects, this speed must necessarily be in the order of at least 45 m.p.h. under normal conditions. For a few hours before dawn, when the ship is probably more or less in equilibrium, it can naturally be flown at a very much lower speed. With increase in size this speed tends to increase approximately at the (dimensions)<sup>1/3</sup> as explained under the heading of dynamic lift.

(2) Theoretical economic speed depends directly on the speed and direction of the wind. This is, in practice, usually determined by the Scott construction as shown. With a favouring wind in the same direction as the path of the ship



Economical speed. Scott construction for wind in any direction



the theoretical economic speed is zero, and with a head wind the theoretical economic speed is given by the formula:—

$$E = \frac{WN}{N - 1}$$

where E = economic speed.

W = speed of the wind.

N = the power at which the petrol consumption increases with speed.

The figure N for ships of the 33 class is in the order of 2.6, owing to loss of propeller efficiency at low speeds.

(3) Practical Economic Speed.—This speed is generally greater than the theoretical speed, owing to temperature effects tending to make the ship light or heavy and to the fact that most winds are of a comparatively local nature. If reasonable meteorological information is available, it is generally possible, by flying at high speed for a few hours, to get into a more favourable wind area, which, in practice, generally gives greater fuel economy than if the ship had been flown for the whole time at the theoretical economic speed.

(4) Standard speeds: Four speeds have been laid down as standard for convenience in preparing performance tables.

(a) *Maximum speed*: The greatest speed the ship can maintain for a short period with all engines running at full throttle.

(b) *Normal full speed* = 90 per cent. maximum speed. Having regard to the prime movers available during the next few years, normal full speed is assumed to be the highest speed at which the ship can run continuously on all engines.

(c) *Cruising speed* = 80 per cent. maximum speed. This speed is assumed to be the normal speed at which the ship would fly with engines giving the same revolutions as for normal full speed, but having regard to the necessity for stopping various engines for small repairs and adjustments, also the possibility of one or more engines breaking down.

(d) *Comparison speed* = 45 m.p.h. This figure has been arbitrarily assumed for the purpose of comparing high and low speed ships on a uniform basis. It has been purposely taken at a low figure in order to estimate the greatest distance it is reasonable to assume a rigid can fly under normal circumstances in still air, and also to give the longest number of hours a rigid can remain on patrol under normal conditions.

(To be continued.)

## TRIBUTE TO CAIRO-CAPE PIONEERS

PRINCE ALBERT was present, in the uniform of a Squadron Leader of the R.A.F., on Wednesday, May 5, at a luncheon given at the Connaught Rooms under the auspices of the Imperial Air Fleet Committee, as a tribute to the courage and endurance shown by the two South African officers of the Royal Air Force—Wing-Com. H. A. Van Ryneveld, D.S.O., M.C., and Flight-Lieut. C. I. Q. Brand, D.S.O., D.F.C., M.C.—who were the first to complete the London-Cairo-Cape flight.

Lord Desborough, chairman of the committee, presided, and amongst the guests invited were the Marquis of Londonderry (Under-Secretary of State for Air), Lord Morris, the Hon. R. A. Blankenberg (Acting High Commissioner for South Africa), Air-Marshal Sir Hugh Trenchard, Bart., D.S.O., Maj.-Gen. Sir F. H. Sykes, Sir George Perley (High Commissioner for Canada), Sir Thomas Mackenzie (High Commissioner for New Zealand), Air-Vice-Marshal Sir J. M. Salmond, Sir Edgar Bowring, Air-Commodore C. L. Lambe, D.S.O., Air-Commodore E. M. Maitland, D.S.O., Mr. E. Manville, M.P., Mr. Stanley Machin (chairman of the London Chamber of Commerce), Maj.-Gen. E. D. Swinton, D.S.O., Wing-Com. Louis Greig, Mr. C. J. Fairfax Scott (hon. organising secretary), Maj. D. R. Maclaren, D.S.O., D.F.C., M.C., Brig.-Gen. W. B. Caddell, Maj. G. H. Scott, A.F.C., Commander H. Perrin, Mr. Alfred Docker, Col. J. Dickson, and Capt. S. Cockerell and Capt. F. C. Broome, two of the other pilots who had also made attempts to accomplish the African flight.

The Chairman, in giving the toast of "The Queen, Queen Alexandra, the Prince of Wales, and other members of the Royal Family," spoke of the double pleasure they felt in having present a representative of the House of Windsor, who was himself connected with the purposes of that gathering.

Prince Albert, who responded, expressed his pleasure at being present at a function in honour of two distinguished men who had added lustre to the name of South Africa in particular and the British Empire in general. He welcomed them home to England, and congratulated them most heartily on their achievement. Their dogged pertinacity and courage and the wonderful spirit they had shown were well worthy of the traditions of British exploration. It was a great pleasure to be the guest of a society which he felt was going to do much for the air power of the British Empire. Apart from its usefulness as an advocate of British aerial supremacy, he felt that its work in forging a new link of Empire was its strongest recommendation. It opened up a new vision of unity, and it was a new bond of union to our widespread commonwealth of nations. They were very fortunate indeed in having a society whose objects were so wide and far-seeing. He wished the Imperial Air Fleet Committee every success in its useful national and imperial work.

The Chairman, in proposing the toast of the two chief guests and "their great imperial flight," remarked that it was three years ago to the very day when General Smuts in that room accepted on behalf of the South African Government the aeroplane "South Africa," which was presented by the Imperial Air Fleet Committee. He recalled that after he accepted the presidency of the Committee the first thing

they did was to inaugurate the flight of the late Mr. Gustav Hamel from Dover to Cologne, a feat which occasioned great surprise to the Germans. Little was it thought then that seven years afterwards two South African aeronauts would mark out on the air that route from England via Cairo to the Cape which was the lifelong dream of Cecil Rhodes. Their guests had shown the most grim determination from the start of their flight to overcome any obstacle they might encounter. They congratulated these "flying Dutchmen." Both of them were born in South Africa, and their services had been brilliant and of great advantage to the British Empire. Lord Weir, who was unable to be present, had written to him congratulating Commander Ryneveld and Flight-Lieut. Brand on their pluck, resourcefulness and courageous enterprise, and adding:—

"Civil aviation must be given its chance of showing what is in it. War taught us much in aviation, but little as to its value as a new system of transport in the cold and hard world of competition. The Imperial Air Fleet Committee helped to a wonderful extent in creating and maintaining a general interest in air matters during the war. Any links which it can now forge between air development as constituted by the Royal Air Force and the new industry of civil aerial transport will have a genuine imperial value, because a healthy Royal Air Force can best be assured by a healthy mercantile air force. The strength of the Royal Navy is in no small measure due to the supreme British mercantile marine and the private shipbuilding industry of our country, and so must it be with the aircraft industry both in its transport and manufacturing spheres of activity."

Air-Marshal Sir Hugh Trenchard, who supported the toast, said that neither South Africa nor any other of the Dominions could have sent us more doughty or determined champions. Their determination was, and is, the outstanding trait in their characters. Though he believed they were not thinking of competition, the determination they showed to get to the Cape first was the same determination that inspired them in battle. Van Ryneveld was quite rightly taking up a post of great importance in South Africa. Brand remained, he hoped, with us. They had linked England and the Cape by air—we could rely upon them to see that the chain held true.

Wing-Com. Van Ryneveld, replying to the toast, acknowledged the wonderful encouragement and support given to himself and his colleague by the committee and the assistance given them throughout by the Royal Air Force. The machine on which the last stage of the flight was accomplished was one of the hundred given to South Africa by the Imperial Government. Wing-Commander Van Ryneveld extended sympathy to the other pilots who had not been so fortunate as he and his colleague in getting relay machines when they crashed. "We have had the adventure of our lives," he added, "and I hope that the lessons that we and the others learnt will be of use in future to pilots who fly under similar conditions."

Flight-Lieut. Brand also replied, and said they set out to do the flight in the shortest possible time, and they did their best. They were indeed glad that their efforts were apparently so much appreciated.



Lord Londonderry, in proposing the health of the Chairman, said he was one of the finest types of Briton. He had excelled in muscle and in intellect in all he had taken up. The Air Service was a struggling service. But it had to be realised that aviation was a science that had come to stay, and that it had colossal potentialities. He would be an audacious individual who would endeavour to set a limit to its possibilities. It required all our assistance, all our energies, and all the activity of organisations like the Imperial Air Fleet Committee to start it on the right lines. He called on them to show to a doubting public, because the public was always doubting, exactly what could be achieved by air transit and transport.

Mr. R. A. Blankenberg, Acting High Commissioner for South Africa, who supported the toast, said that the fact that the flight was accomplished by Afrikanders had created tremendous pleasure in South Africa. He hoped that the lessons and experience of the flight would not be lost on the commercial community. They hoped that one day, for

some portions, at least, of the route, a service might be established. The actual flying time for the whole journey was 109½ hours, and he thought it was reasonably clear that, with relays of pilots and machines, the journey from London to Cape Town and vice-versa might in the early future be performed in less than five days. He thought they all realised that commercial flying was no longer a dream. It was reasonable to hope that business men, politicians, and others would in the future utilise the air service and get into more frequent touch with the more distant parts of the Empire.

He read an extract from a minute from the Union Government to the Home Government expressing warm appreciation of the high enterprise of the latter in laying out the aerial route to Cape Town, and deep gratitude for the work accomplished in connection with the flight by the Royal Air Force.

Lord Desborough in reply expressed to Prince Albert the thanks of the company for his presence.

## ROYAL AERONAUTICAL SOCIETY NOTICES



**Lectures.**—The next meeting will take place on Wednesday, May 26, when Sir Richard Glazebrook will read a paper on "Some Points of Importance in the Work of the Advisory Committee for Aeronautics."

**Donations.**—The Council desire gratefully to acknowledge the receipt of a set of lantern slides from Messrs. Boulton and Paul, Ltd., and also of a number of copies of back numbers of the *Journal* from Col. F. K. McClean.

**Lilienthal Glider.**—The Lilienthal Glider belonging to the Society, which has been for some years on exhibition in the Royal Scottish Museum, Edinburgh, has been transferred on permanent loan to the Science Museum, South Kensington, at the request of the museum authorities. It will take its place in the aeronautical exhibit which is in process of formation at South Kensington for educational purposes.

The Pilcher Glider is remaining at the Edinburgh Museum on permanent loan.

**Obituary.**—It is with much regret that the death is an-

nounced of Dr. L. E. Stamm, who did valuable research work in studying the effect of flying on the human system. Members will remember that Dr. Stamm read a paper entitled "Medical Aspects of Aviation" on this subject in January, 1919.

**Scottish Branch.**—Col. Bristow, Associate Fellow, delivered his series of lectures on aeronautical engines to the students of Glasgow University on the 3rd, 4th and 5th instant, when the attendances were notably good. General J. D. Cormack, Fellow, presided.

**Imperial College of Science and Technology.**—The attention of members and students is called to the courses of lectures on "Aerodynamics," to be delivered on Wednesdays and Fridays at 5 p.m. at the Imperial College, South Kensington, by Dr. L. Bairstow, Fellow, Professor of Aerodynamics at the College. Sir Richard Glazebrook, Fellow, Zharoff Professor of Aviation, is also continuing his series of elementary courses on "Aviation" at the College.

W. LOCKWOOD MARSH,  
Secretary.

7, Albemarle Street, London.

## AIR MAILS TO PARIS

THE following announcement was issued by the General Post Office on Monday last:—

"The Postmaster-General gives notice that on and after Wednesday, the 12th instant, the present 12.30 p.m. despatch of mails by air to Paris will cease, and two despatches, at 9.30 a.m. and 4.30 p.m., will be established instead. On and from the same date, postal packets (other than parcels) not intended for express delivery will be admitted to the service, as well as those for which express delivery is required. The rates of charge, in addition to the ordinary postage (e.g., 2½d. for the first ounce and 1½d. for each succeeding ounce in the case of letters) will be: For air transmission, without express delivery, 2s. per ounce; for express delivery, if required, an additional fee of 6d. per packet, irrespective of weight. Every postal packet intended for despatch by air must bear in the left-hand top corner of the cover the words "Air Mail Express" if express delivery is required, or "Air Mail" if express delivery is not required. The appropriate fee must be prepaid in stamps affixed to the cover.

"9.30 a.m. Despatch.—This will benefit chiefly letters posted overnight, whether in London or in the provinces, for Paris, which should reach the addressees in the early afternoon, if prepaid for express delivery and in the afternoon or evening if not so prepaid. All postal packets for this despatch, whether for express delivery or not, should, if unregistered, be enclosed in an outer cover addressed to the Postmaster, Croydon. Both covers should be marked "Air Mail" or "Air Mail Express," as the case may be; but the postage stamps should be affixed to the inside, not to the outside, cover. The packets should be posted in the public letter boxes in the ordinary way—in the provinces in good time for the night mails to London; in London before the latest night collections, e.g., General Post Office, 12.25 a.m.; head district offices, about midnight; sub-districts, 10-11 p.m. Registered postal packets must not be posted under cover, and can, for the present, be accepted only at certain offices where special arrangements exist.

"4.30 p.m. Despatch.—This will benefit chiefly letters from London for Paris and for places beyond Paris. Letters for express delivery may be delivered in Paris the same night and others by first post next morning, as compared with delivery on the following afternoon if sent by the ordinary mail service. Letters for places beyond Paris, for Switzerland, Italy, Spain, and Portugal, etc., should obtain from 12-24 hours' acceleration. In London and Croydon packets, if handed in, may be accepted up till the following latest times:—

	Unregistered.	Registered.
General Post Office	.. 3. 0 p.m.	.. 2.55 p.m.
Threadneedle Street	.. 2.45 p.m.	.. 2.40 p.m.
Lombard Street	.. 2.45 p.m.	.. 2.40 p.m.
Parliament Street	.. 3.15 p.m.	.. 3.10 p.m.
Charing Cross	.. 3.15 p.m.	.. 3.10 p.m.
W.C.D.O.	.. 3.10 p.m.	.. 3. 5 p.m.
W.D.O.	.. 2.45 p.m.	.. 2.40 p.m.
S.W.D.O.	.. 3.10 p.m.	.. 3. 5 p.m.
Croydon	.. 3.50 p.m.	.. 3.45 p.m.

"Registered packets cannot, for the present, be accepted at any other offices in London, but unregistered packets may be posted under cover to the Postmaster, Croydon, in the same way as for the 9.30 a.m. despatch, in time for the latest appropriate collection.

"The 9.30 a.m. Air Despatch on Fridays will normally connect with the mail despatched from London the previous evening for Egypt, Aden, and East Africa, India, Ceylon, Straits Settlements, Hong-Kong, and, in certain weeks, Australia."

The passenger services have also been re-arranged and aeroplanes now leave Croydon at 9.30 a.m. and 4.30 p.m. daily, with a similar service from Paris. New and faster Airco machines are being put on the service and it is hoped to reduce the flying time between the two capitals to two hours.



# CORRESPONDENCE

[The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.]

## WING LIFT

[1919] It is evident that the reason an inclined plane tends to rise when facing a horizontal current of air is the result of the reaction on the plane due to the disturbance it creates in the air current, but this has been expressed in various ways. For instance, it has been said to be due to the air entering horizontally and leaving in a downward direction, such direction being the resultant of the angles of the upper and lower surfaces at the trailing edge. This method of expression, however, appears incorrect when it is known that a plane will lift when the rear portion is flattened out to the horizontal, or even turned up. It is also explained as the pressure on the under surface and a tendency to vacuum on the upper surface. This, however, would give a centre of pressure somewhere between the centre line of the plane and the trailing edge, but the centre of pressure is actually in front of the centre line of the plane. Therefore this statement of the case appears faulty. Moreover, it does not satisfactorily explain the movement forward of the centre of pressure with decrease of angle, and then rearward again for very small angles down to zero, nor does it explain the reason a lift is experienced when the chord is horizontal. Further, it is stated that the air current follows the curve of the upper and lower surfaces, but, if such is the case, how does a cambered plane, whose chord is horizontal experience a lift, since there must be a tendency to create a vacuum and therefore a downward pressure or stress on the under surface, and a downward pressure on the forward portion of the upper surface, the only upward pressure being due to a tendency to create a vacuum on the rear portion of the upper surface?

Since the foregoing explanations do not appear to cover the facts, may I put forward the suggestion that when a cambered plane is placed at a small negative angle of incidence to a current of air, or at such a positive angle of incidence that there is a tendency to create a vacuum on a portion or the whole of the under surface, the air current does not properly follow the curve of the under surface, but cuts across that portion in which it tends to create the vacuum, and in doing so sets up a revolving motion of the air enclosed therein, thus causing the plane to ride upon an air roller the length of the plane and which is kept revolving at high speed by the friction of the air current in contact with the under surface of the roller, and the greater the velocity of the air current, the more swiftly the air roller revolves. Since this roller, however, will generally be more or less elliptical in shape, and will consequently exert considerable force in attempting to become circular, and it cannot accomplish this without either pressing the air current downwards or raising the plane, it thereby gives a lifting force to the under side of the plane. This explanation I think covers rather satisfactorily the known results. For instance, in Fig. 1, "a" shows a cambered plane at a large angle of incidence, "b" at a small angle, and "c" at no angle to the air current meeting it.



If this theory is correct, it would appear that the utility of the roller would be twofold—namely, reduction of friction between the air current and the under side of the wing, and the fact that the upper surface of the roller will tend to roll the wing forward at the same speed as that at which the periphery of the roller rotates, and it would therefore appear that a wing specially constructed to produce the most efficient roller on being drawn through the air at an efficient angle (probably in the neighbourhood of zero) by means of an engine would accordingly offer no resistance at any velocity

except that due to the production of the slight vacuum toward the rear of the upper surface and the energy absorbed in compressing the roller to an elliptical shape; the latter however, will give back this energy in the form of lift, and a machine with a specified horse-power would accordingly be capable of very much higher speed when fitted with these wings than with the usual type of wing, and therefore of greater lifting power. In order to reduce the speed for rising and landing, it would be preferable to have the facility of varying the angle of incidence of the wings. By this means heavy loads could be carried, for a machine having risen slowly with the wings or whole machine at a comparatively steep angle, the angle would be reduced to bring the roller into being, when considerable acceleration would take place due to the functioning of the roller, which increased speed together with the centrifugal force in the roller would continue to support the load.



Fig. 2 shows my idea of the wing section for specially producing the roller action, the wing preferably being of high aspect ratio in order to bring as much of the under surface as possible within the action of the roller.

Crewe.

C. W. SLINGO.

## THE SIDE-SLIP LANDING

[2020] Having noticed that "L. T. P." wishes to hear more on the above subject, I must ask you to allow me to reply. In the first place, my letter did not imply that side-slipping is unnecessary. The side-slip landing is extremely useful, and I should like to know where I implied that it is not. The point I endeavoured to make clear was that side-slipping as a means of losing superfluous height without appreciable forward movement is very useful, but to glide in and use your keel surface to check speed every now and then, as Lieut. Courtney implied, is not correct practice.

To judge by the extravagance of "L. T. P.'s" praise for one who can glide in from any height and do a spot landing, I take it that he cannot do it himself; probably through missing the opportunity of being taught while such schools as Gosport and Lilbourne were showing how it could be done. I must ask him to be good enough to read the last sentence of "R.A.F.'s" letter which immediately followed mine. May I suggest that "L. T. P." endeavoured to become a "very clever pilot indeed" by mastering the elementary principles of flying on the glide—a form of flying to which too little attention was paid by the average instructor.

I was denied the pleasure of flying a "9A." An opportunity never came my way. Provided that a three-point landing is made, however, I should judge from what I have seen that the distance run on the ground would be under 60 yards. It is the length of the hold-off usually seen with this type which makes it appear to require an immense amount of space.

Adding 10 m.p.h. to one's speed may be difficult to some without looking at the clock. It is a matter of judgment.

In para. 4 "L. T. P." again objects to my views, and advocates gliding so fast that an airbrake is necessary from time to time. Why put on speed and then take it off? Will "L. T. P." please refer to my last sentence, para. 4?

In para. 5 he says he does not think that correct side-slipping needs practice. Admittedly plain side-slipping does not. Most of us during our first hour's efforts nearly blew our heads off, and wondered why the wind persisted in coming sideways! To carry it out correctly is another matter altogether. One cannot do anything correctly without practice, and what "instinct" tells you is right is often entirely wrong. Here again "R.A.F.'s" remark applies.

May 8.

E. J. D.

## German Aerodromes to be Destroyed?

FROM a semi-official statement made in Berlin on May 6 it would appear that, in accordance with the Peace Treaty, the German military air service will be disbanded.

From an article published in the *Tägliche Rundschau* it would appear that the Entente Commission intends to destroy

all aerodromes and flying establishments, the cost of which is given as 60 million marks, leaving only one hangar and one aeroplane factory, which will be used for an international air service.

It is complained that this means a most serious economic blow at Germany at a time when building for industrial purposes is impossible.



# AIRISMS

## FROM THE Four Winds.

JULY 10. Lest we forget.

JULY 10. The day when Germany may resume building aircraft without let or hindrance.

JULY 10. The day upon which Germany starts once again preparing for "Der Tag"—this time in the Air.

JULY 10. M. Andre Michelin, president of the French Aero Club, one of the most far-seeing students of affairs of the Air, foretells the immediate re-setting to work of the 100,000 workmen in the 180 German factories devoted to aircraft production.

JULY 10. What about it?

JULY 10. Lest our Authorities forget.

WHEN the Government in 1916 commandeered De Keyser's Hotel for the use of the Air Service, and it transpired that the annexation was to be a Dora-By-Grace ramp, **FLIGHT** protested against such a violation of the rights of citizens by bureaucratic confiscation, without compensation. Since then, from time to time the same protest has been repeated, as it was but anything in keeping with the times that such an obvious injustice should be saddled on to His Majesty King George by the grabbing bureaucrats, under the cloak of "the Royal Prerogative." It is therefore intensely gratifying that another of **FLIGHT**'s contentions has been now so amply justified in the unequivocal judgment of the House of Lords against the claims, "in the King's name," of Bureaucracy. Moreover, not only has it now been affirmed by the highest legal authorities that no such confiscatory rights now exist either in the name of the King or otherwise, but Lord Moulton specifically in his judgment goes out of his way to point out

that "whatever might be the view of the Royal Prerogative, there had grown up a national sentiment that any burden which was borne for the good of the Nation should be distributed over the whole Nation."

Which smacks uncommonly of sound British Justice, and must be a very wry bolus for the great official grabbers to swallow.

No wonder the Attorney-General wanted last week to hurry up the passing into law of the Indemnity Bill, which would have automatically wiped out every citizen's *right* whatsoever to compensation for any injustice which may have been illegally perpetrated. We're not sure, even now, that when this whitewashing Act is made law, it will be found all personal rights will have been overridden by its clauses. But this Lords judgment must all the same give the legal enactors of the Bill "to think furiously."

MEXICO City being cut off by the rebel forces, it is hardly surprising to learn that under the existing circumstances of turmoil in Mexico, President Carranza had in reserve an aeroplane ready at the psychological moment to take him to the port of Vera Cruz, although this is hard to fit into the happenings and capture of the President since.

AERIAL photography as a serious factor of the future is no dream. Its value in many directions is coming more and more to be recognised. In connection with a Parliamentary Bill it has recently played quite a helpful part. In the Committee-room the Corporation of Edinburgh, in evidence put forward in support of its claim for the absorption of Leith a photograph of the area, taken for the purpose by an airman. The bird's-eye view was used as a proof of the fact that the Scottish capital and its seaport neighbour



King Albert of Belgium and his Queen arrive at Farnborough from Brussels by air, to attend the wedding of Lady Cynthia Curzon: The Royal Couple, accompanied by General Lord Rawlinson and Air Vice-Marshal Sir John Salmond, are seen just leaving the Farnborough Aerodrome for Aldershot



form for practical purposes one community, and ought to be one for municipal purposes, as they already are for the distribution of gas, water, and other services. The air photograph, it is affirmed, had much to do with Edinburgh's easy victory.

AGAIN, in "Strategic Camouflage," by Mr. Solomon J. Solomon, R.A., very far-reaching results affecting future war tactics, it is claimed, can be obtained and countered by scientific analysis of photographs so obtained. Mr. Solomon has set out his theories, the result of observation at the scene of the hostilities, in the above work just issued by John Murray, and in his views is in conflict with the opinions hitherto held by military authority. The stand taken up by the Author is a very definite one. In a digest by "H. V. M." of the theory now put forward, it would appear that Mr. Solomon by the careful examination of certain aerial photographs taken in Flanders came to the conclusion that the enemy was erecting at various strategic points in back areas vast underground burrows or anti-aircraft shelters in which enormous bodies of troops could be massed and hidden from aircraft during the day.

These shelters were not, he insists, dug-outs, but large camouflaged areas covering many acres, made of thin wood and painted to resemble cornfields and farm land, complete with haystacks and other natural features. Such hiding-places, he says, were employed with a system of covered roads leading to them, thus composing a landscape whose essential falseness could only be detected by the expert eye of the artist trained in the science of shadow.

The whole point of the argument stands or falls on the right reading of certain extremely interesting aerial photographs to be seen in Mr. Solomon's studio, and reproduced in his book. To attempt any detailed analysis of specific instances of these underground concentration camps without the visual support of photographs would be difficult. The book hangs upon the pictures. The photographs are the thing that matters, and the whole question resolves itself into this: Are certain suspicious-looking areas on these photographs due to an unsuspected and cunning employment of camouflage or are they merely peculiarities of the landscape?

A DOUBT has been expressed upon the accuracy of some of Mr. Solomon's explanatory diagrams and upon the reproduction of the photographs—which, of course, hits out at the very root of the argument. Before writing this, "H. V. M." therefore examined the originals in the artist's studio, and states that Mr. Solomon has adhered strictly to the photographs in all pen and paint diagrams taken from them. There is no exaggeration of salient features. He has not been swayed by a pre-conceived conviction. The original photographic enlargements of St. Pierre Capelle, where one of the camouflaged burrows is alleged to have existed, serve only to accentuate those peculiarities upon which Mr. Solomon bases his theory. Contrasted with other

aerial views of known sound land there is certainly a marked difference.

But whether the long, straight corn land behind St. Pierre Capelle, with the regular rows of corn stooks, is camouflage or not, "H. V. M." would not dare to say. The evidence of a layman's eye is worth nothing. The question lies between the eye of the military expert and the eye of a man who has spent his life studying the effect of light and shade, the science of shadow and the art of making objects appear round on a flat surface.

Mr. SOLOMON is convinced that his trained eye is not deceiving him. *Shadows, and lack of shadow where shadow ought to be, put him on the track of this "discovery."* Such violations of natural laws prove the not quite clever enough hand of man. Houses that cast no shadow in sunlight and trees whose shade defies the direction imposed by the sun on all other tree shadows would, it might be imagined, have seemed sufficiently suspicious to have justified the attention of an aerial bombardment. But apparently even this recognition was not granted.

"How do you account for the fact that none of these intricate structures were discovered by our advancing troops?" Mr. Solomon was asked by "H. V. M."

"It was a secret, unlike the enormous areas hidden under the German version of our fishing net camouflage. I believe that all these giant shelters were at once destroyed before the German evacuation, which accounts for the huge fires seen behind their lines."

"Why do you think the Air Force experts turned down your theory?"

"The science of reading aerial photographs to detect art from nature cannot be done by the amateur eye. It needs the eyes of men who have imitated nature in their work. To set an amateur to this work is like asking a man with no knowledge of arithmetic to solve a deep problem in mathematics. I am not distressed that Air Force experts should disbelieve me."

In conclusion, Mr. Solomon states that all he asks is that his evidence shall be examined fairly, by reason of its great importance in the event of future wars.

QUITE the clearest meteorological map of the British Isles we have seen for some time is the large weather map exhibited in the window of Empire House in Kingsway, the Home of the Air Ministry. This shows the general conditions that prevail day by day, arrows indicate the direction of the wind, visibility is given in yards or miles, and temperature is shown at different parts of the country. It strikes us that some simple form of diagram upon the same lines in the daily papers which make a feature of this sort of thing would be much more to the understanding of the average reader than the somewhat complicated "guides" which have been generally in evidence.

## PERSONALS

### Married

FL-Lieut. J. H. HAGON, R.A.F., Airship Station, Howden, was married on April 15, at The Oratory, to ELIZABETH O'SULLIVAN, ex-W.R.N.S., youngest daughter of the late J. J. and Mrs. O'Sullivan, Carranthal, Aberystwyth.

FORDE LEATHLEY, M.C., the Royal Inniskilling Fusiliers and Royal Air Force, was married on April 27, at St. George's, Hanover Square, to IDA, the only child of the late GEORGE EDWARD FOSTER and Mrs. Foster, 7, Bickenhall Mansions, W.

GEORGE HENRY WARNEKEN (Lieut., late R.A.F.), youngest son of Henry H. Warneken, of Pembroke Villas, W., was married on April 22, at St. Matthias' Church, Richmond, to IRENE FLORENCE, elder daughter of CHARLES SHILSON, of Cardigan Gate, Richmond, Surrey.

### To be Married

A marriage has been arranged, and will shortly take place, between Lieut. G. BRYER ASH, late Duke of Edinburgh's Wilts Regt. and R.A.F., only son of Mr. G. Bryer Ash, J.P., and Mrs. G. Bryer Ash, of Moor Lodge, Weymouth, and Miss GWENDOLYN WILLIAMS, youngest daughter of Mr. and Mrs. Gascoyne Williams, of Armadale, Melbourne, Australia.

A marriage has been arranged, and will shortly take place, between the Rev. J. DUNCAN BOLTON, Hon. C.F., R.A.F., and vicar of St. Faith's, Wandsworth Common, S.W., eldest and only surviving son of the late Edward Bolton, of Liverpool, and of Mrs. Bolton, of London, and MATILDA, youngest daughter of the late ANNIE and HENRY SAMUEL CROSBIE, and granddaughter of the late Mrs. Henry DeVaeve Crosbie, of Liverpool.

The engagement is announced of Capt. WALTER E. G. BRYANT, Royal Fusiliers and R.A.F., eldest son of Mr. and Mrs. W. E. Bryant, of West Well, Streatham Common, and SYBIL MARY, only daughter of Mr. and Mrs. JAMES PROUT, of Ederline Avenue, Norbury.

A marriage has been arranged, and will shortly take place, between Maj. LEWIS AUBREY COKER, O.B.E., R.A.F., only surviving son of Col. and Mrs. Coker, of Bicester House, Oxfordshire, and MARGARET MADELEINE, younger daughter of Mr. and Mrs. William J. Mirrlees, Mount Blow, Shelford, Cambridge.

The marriage arranged between Mr. F. J. PEACOCK (late R.F.C.), of Biddenham, and Miss DAISY TURNER, of Southrey, will take place quietly early in June.

### Items

Mr. WALTER F. NICHOLSON, C.B., the Assistant Secretary of the Admiralty, who has been appointed Secretary of the Air Ministry, is a St. Paul's and Balliol man. He entered the Admiralty in 1899, and acted as private secretary to the Second Sea Lord from 1902 till 1904, and to the First Sea Lord (Admirals of the Fleet Lord Fisher and Sir A. K. Wilson) from 1904 till 1911, when he was appointed a principal clerk.

A Committee of members of the House of Commons, including Sir Newton Moore, Mr. Hartshorn, Sir Charles Sykes, is being formed with Mr. A. T. Davies as Hon. Sec., with the object of arranging for the presentation of a gift to Miss LAW on the occasion of her approaching marriage to Maj.-Gen. Sir F. H. SYKES.



# THE ROYAL AIR FORCE

*London Gazette, April 30*  
Air Vice-Marshal J. F. A. Higgins, C.B., D.S.O., A.F.C., is placed on half-pay (Scale A); May 1.

## Flying Branch

Flying Officer C. J. W. Hatcher, A.F.C., relinquishes the grading for pay and allowances as Flight-Lieut., on ceasing to be employed as Flight-Lieut. (A'ship); March 18.

Pilot Officers to be Flying Officers:—R. Pyper; March 21. J. E. Roberts; March 26.

Canadian Cadet O. H. Young is granted a temp. commn. as Sec. Lieut. (A.); Oct. 17, 1918. Pilot Officer A. G. Lawe (Lieut., Linc. R.) relinquishes his temp. R.A.F. commn. on return to Army duty; April 21.

(Then follow the names of 17 officers who are transfd. to the Unemployed List under various dates.)

Sec. Lieut. C. H. Thomas relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; April 22. Flight-Lieut. A. J. Mitchell-Clarke, M.C. (late Lieut., Glouc. R.), having retired from the Army and relinquished his R.A.F. commn., is granted the rank of Maj. The rank of Lieut. N. B. Giddens is as now described, and not as stated in *Gazette* of March 9.

The notifications in *Gazette* of July 29, 1919, concerning Lieut. W. Whitaker; *Gazette*, April 4, 1919, Lieut. A. E. Evans; *Gazette*, June 6, 1919, Sec. Lieut. C. A. Bonar (*Gazette*, June 3, 1919, to stand), are cancelled.

The initials of 177712 Cadet V. F. Green are as now described and not V. P. as stated in *Gazette* of Dec. 10, 1918, on page 14,574.

## Administrative Branch

Sqdn. Ldr. (actg. Wing Cmdr.) H. B. Bonning relinquishes the actg. rank of Wing Cmdr. on ceasing to be employed as Wing Cmdr.; May 1.

F. Allen (Capt. and Qmr., Ches. R.) is granted a temp. commn. as Lieut., and to be hon. Capt.; Oct. 12, 1918 (substituted for notification in *Gazette* of Nov. 1, 1918). Lieut. R. F. Bradford (Lieut., Devon. R. (Res. of O.) relinquishes his temp. R.A.F. commn. on return to Army duty; Dec. 17, 1918.

(Then follow the names of four officers who are transfd. to the Unemployed List under various dates.)

The notification in *Gazettes* of July 8, 1919, and March 5, concerning Lieut. A. R. Harris are cancelled. (Substituted for notification in *Gazette* April 23).

## Technical Branch

Pilot Officer F. H. Davis to be Flying Officer, Grade (A); Oct. 1, 1919. Flying Officer F. H. Cashmore is graded for purposes of pay and allowances as Flying Officer, Grade (A); March 13.

(Then follow the name of six officers who are transfd. to the Unemployed List under various dates.)

Capt. E. Parker (E. Lancs. R. (S.R.)) relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; April 23. The rank of Lieut. F. M. Rayment is as now described, and not as stated in *Gazette* Nov. 11, 1919.

## Medical Branch

Lieut.-Col. G. N. Biggs, M.B. (Maj., R.A.M.C. (T.F.)), relinquishes his temp. R.A.F. commn. on return to Army duty, and is permitted to retain his rank of Lieut.-Col.; April 19.

(One officer transfd. to the Unemployed List.)

*London Gazette, May 4*

## Permanent and Short Service Commissions

The notifications in *Gazette* of Aug. 1, 1919, appointing Lieut. A. T. Wynyard-Wright (S.O.), Lieut. R. W. Rayn (A.), and Lieut. J. M. Bell (S.O.) to permanent commissions are cancelled. The last-mentioned officer is granted a short service commn., with effect from Aug. 1, 1919.

The following officers have been granted short service commissions in the ranks stated, with effect from May 4 (except where otherwise stated). They will retain their seniority in the substantive rank last held by them prior to the grant of the short service commn.

In the case of officers now gazetted Flying or Observer Officer from Pilot Officer, seniority will date from the date of *Gazette*:—

Flight Lieutenant.—E. Gribben, M.C. (A.).

Flying Officer (from Flight Lieutenant).—H. H. Balfour, M.C. (A.), with effect from April 26.

Flying Officers.—A. J. Macqueen (A.); W. A. Pritt, M.C. (A.), with effect from April 19; J. Robertson (T.).

Flying Officer (from Pilot Officer).—H. J. Mitchell (A.).

Observer Officer (from Pilot Officer).—J. T. A. Lochner.

The notification in *Gazette* of April 13, concerning Flying Officer R. J. P. Grebby, D.F.C. (A.), is cancelled, and that in *Gazette* of Jan. 30, appointing this officer to a short service commn., stands.

The notifications appearing in *Gazettes* of the dates indicated below, appointing the following officers to short service commissions, are cancelled:—Flying Officer F. H. Davis (T.); Oct. 24, 1919. Flying Officer H. J. Saker (A.); March 30. Flying Officer G. R. St. C. Gwynne-Timothy (A.) resigns his short service commn.; May 5. Flying Officer G. H. Howarth (A.) relinquishes his short service commn. on account of ill-health contracted in the service; May 4.

## Reseconding

Flying Officer W. B. Clarke, M.C. (A.) (Lieut., R.G.A.), is reseconded to the R.A.F. for a period of two years with effect from Aug. 1, 1919.

The ranks of Flying Officer V. O. Reynolds (A.) and Flying Officer L. Darvall, M.C. (A. and S.) are as now described, and not as shown in *Gazette* of April 27.

## Flying Branch

Capt. A. Durston, A.F.C., is graded for purposes of pay and allices. as Maj. whilst employed as Maj. (S.); from May 1, 1919, to May 20, 1919.

The following Flying Officers (actg. Flight-Lieuts.) relinquish the actg. rank of Flight-Lieut. on ceasing to be employed as Flight-Lieut. (A.):—E. J. Head; G. G. Tomling, O.B.E., M.C.; April 21.

Second Lieutenant to be Lieutenant:—G. W. Mitchell; Sept. 28, 1918, since demobilised.

The following relinquish their temp. R.A.F. commissions on return to Army duty:—Pilot Officer B. O. Wilkin (Sec. Lieut., D. of Corn. L.I.); Oct. 27, 1919. Flight Lieut. H. Colmore (Capt., 7th Hussars); April 1. Flying Officer (Hon. Flight Lieut.) E. G. Baxter (Capt., I.A.R.O.) relinquishes his temp. R.A.F. commn. on reversion to I.A.R.O.; April 14. Sec. Lieut. A. Y. Paton, D.C.M., relinquishes his commn. on ceasing to be employed; Oct. 10, 1919.

(Then follow the names of 28 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their commissions on account of ill-health

contracted on active service, and are permitted to retain their rank:—R. J. Smith; April 25. A. E. Parsons; April 26. H. S. Crees (caused by wounds); April 28. D. C. Fuller; April 30.

The notification in *Gazette* of Nov. 4, 1919, concerning Sec. Lieut. A. Y. Paton, D.C.M., is cancelled.

## Administrative Branch

Sec. Lieut. (Hon. Lieut.) S. Waring to be Lieut.; April 26, 1918 (since relinquished commn.). Pilot Officer J. Mackay to be Flying Officer; Nov. 22, 1919 (since demobilised). Sec. Lieut. A. A. Mackay (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut.; Nov. 23, 1918.

(Then follow the names of 6 officers who are transfd. to the Unemployed List under various dates.)

Lieut. A. S. Dark (late R.W. Fus.), having retired from the Army and relinquished his R.A.F. commn., is granted rank of Capt.

The rank of Lieut. D. H. Woodhouse is as now described, and not as stated in *Gazette* July 25, 1919.

The notifications in *Gazettes* Dec. 31, 1918, and Nov. 4, 1919, concerning Sec. Lieut. A. F. Johnston and *Gazette* May 27, 1919, concerning Sec. Lieut. A. P. Johnston are cancelled.

## Technical Branch

Cpts. to be actg. Maj. while employed as Maj.:—W. E. L. Sear, M.C.; Aug. 17, 1918 (substd. for notification in *Gazette* Feb. 11, 1919). M. Keegan, Grade (A.); Sept. 1, 1918 (substd. for notification in *Gazette*, Oct. 15, 1918).

Capt. R. G. Booth is graded for purposes of pay and allices. as Maj. while employed as Maj., Grade (A.), from May 1, 1919, to Feb. 22.

Lieut. J. C. Andrews, M.B.E., to be Lieut., Grade (B.), from (A. and S.); May 5, 1918. Lieut. (Hon. Capt.) C. C. Clark to be Lieut., Grade (B.), from (A.); Nov. 21, 1918, and is graded for purposes of pay and allices. as Sec. Lieut.

while employed as Sec. Lieut., Grade (B.); Nov. 21, 1918. Lieut. (Hon. Capt.) C. C. Clark to be Lieut., Grade (A.), from Grade (B.); Feb. 6, 1919; and is graded for purposes of pay and allices. as Sec. Lieut. while employed as Sec. Lieut. Grade (A.); Feb. 6, 1919. Lieut. (Hon. Capt.) C. C. Clark is graded for purposes of pay and allices. as Lieut. while employed as Lieut., Grade (A.), from May 1, 1919, to Sept. 9, 1919.

Second Lieutenants to be Lieutenants:—L. A. Lavender; Dec. 22, 1918 (notification in *Gazette*, Sept. 12, 1919, to stand). I. van N. Reynecke, Grade (A.); April 15, 1919 (since demobilised). H. Butler; July 11, 1919 (without pay and allices. of that rank prior to Oct. 7, 1919). J. Piggott; July 15, 1919 (without pay and allices. of that rank prior to Nov. 17, 1919). Sec. Lieut. A. F. Johnston to be actg. Lieut. while employed as Lieut., Grade (B.); Oct. 3, 1918. Sec. Lieut. A. F. Johnston is graded for purposes of pay and allices. as Lieut. while employed as Lieut., Grade (B.); May 1, 1919.

Pilot Officers to be Flying Officers:—A. H. Baker, M. Dickinson, D.S.M., R. J. E. Haynes, M. C. Head, J. W. Hutchins, G. Lacey, J. H. Slater, M.B.E., F. J. Tadmam, C.G.M., H. J. Usher, V. F. Whalling, D.S.M.; Oct. 1, 1919. E. A. Davies (without pay and allices. prior to Dec. 5, 1919) (since demobilised). Pilot Officers to be Flying Officers, without pay and allowances of that rank:—A. Maughan; Oct. 1, 1919. W. A. Westley; Jan. 1 (since demobilised).

(Then follow the names of 11 officers who are transfd. to the Unemployed List under various dates.)

Sqdn. Leader G. E. Smith, O.B.E. (late Capt., E. Yorks R.), having retired from the Army and relinquished his R.A.F. commn., is permitted to retain rank of Maj. The rank of Lieut. J. Kibble is as now described, and not as stated in *Gazette* of Oct. 31, 1919. The initials of Sec. Lieut. (Hon. Capt.) C. C. Clark are as now described, and not as stated in *Gazette* of July 22, 1919.

The notifications in *Gazettes* of Dec. 13, 1918, April 1, 1919, July 22, 1919, and Jan. 13, 1920, concerning Sec. Lieut. (Hon. Capt.) C. C. Clark are cancelled.

## Memoranda

The following Proby. Flight Officers are granted hon. commissions as Second Lieuts.:—C. Pease; Jan. 21, 1919. C. A. Bush, H. Patterson; Feb. 21, 1919. S. C. Coffey; Feb. 23, 1919. W. F. Clark; April 21, 1919.

(Then follow the names of 58 Cadets granted hon. commissions as Sec. Lieuts.) One officer is transferred to the Unemployed List.

Flying Officer W. E. Harper, M.C., from (S.O.), relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain rank of Flying Officer; May 1.

Sec. Lieut. C. M. McAlister relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; April 13.

*London Gazette, May 7*

## Flying Branch

The following relinquish their temp. R.A.F. commissions on return to Army duty:—Pilot Officer (Hon. Flying Officer) C. Caiger-Watson, M.C. (Lieut. R. Ir. Fus.); April 6. Flying officer W. C. Williams (Lieut., Leic. R.); April 8. Flying officer (Hon. Flight Lieut.) H. W. Deacon, D.F.C. (Capt. R.F.A.); April 30.

(Then follow the names of 21 officers who are transfd. to the Unemployed List under various dates.)

Lieut. O. F. D. Jackson relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; May 7.

Sec. Lieut. H. R. Hillick relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; April 29.

Pilot Officer F. C. Phillips retires with gratuity, and is permitted to retain rank of Sec. Lieut.; May 8.

The notification in *Gazette*, April 16, concerning Sec. Lieut. J. T. O'Brien-Saint is cancelled.

## Administrative Branch

Flight Lieut. (actg. Sqdn. Leader) J. P. H. Hayes, relinquishes actg. rank of Sqdn. Leader on ceasing to be employed as Sqdn. Leader; Feb. 14.

Capt. M. Lewis to be Capt. from (T.), April 12, 1918, and is graded for purposes of pay and allowances as Lieut.; April 12, 1918. Flight Lieut. E. W. T. Beck, D.S.O., M.C. (Capt. R. Fus.), relinquishes his temp. R.A.F. commn. on return to Army duty; April 19. Flight Lieut. C. L. Cahill (Lieut., R.N.), relinquishes his temp. R.A.F. commn. on return to Naval duty; April 27.

(Then follow the names of 7 officers who are transfd. to the Unemployed List under various dates.)

Lieut. J. D. Lorraine (Durh. L.I., T.F.), relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; April 29. The rank of Flying Officer W. A. Glasper is as now described, and not as stated in the *Gazette*, April 20. The notification in *Gazette*, Aug. 23, 1918, concerning Lieut. M. Lewis is cancelled.



### Technical Branch

Lieut. G. Felstead, D.C.M., is graded for purposes of pay and allowances as Lieut., Grade (B), from May 13, 1919, to Oct. 18, 1919. (Then follow the names of 5 officers who are transd. to the Unemployed List under various dates.)

Lieut. C. Littlejohn, M.M. (Sec. Lieut., Gen. List), relinquishes his temp. R.A.F. commn. on retirement from Army, and is permitted to retain rank

of Lieut.; May 8. The rank of Flight Lieut. J. S. Goggin is as now described, and not as stated in the *Gazette* of April 20. The notification in the *Gazette* of April 13 concerning Flight Lieut. T. G. Gordon, M.B.E., is cancelled.

### Medical Branch

Capt. C. P. V. MacCormack relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; April 29.

## AVIATION IN PARLIAMENT

### The Wearing of Swords

CAPT. W. BENN, in the House of Commons on May 4, asked the Secretary of State for War and Air whether swords form part of the uniform of Air Force officers; and, if so, why they are required?

Mr. Churchill: A sword forms part of the full dress uniform of Royal Air Force officers. Swords have always been worn by officers of the fighting services in this and other countries, as part of the recognised insignia of their rank.

Mr. Lambert: May I ask the right hon. gentleman as a great military genius whether the sword has not become an obsolete weapon?

Mr. Churchill: Even the civil officials of the Government Departments and Ministers on ceremonial occasions are entitled to wear swords.

Mr. Lambert: Are the civilians who wear swords expected to fight?

Mr. Churchill: The wearing of a sword implies no obligation to use it. Capt. Benn: Does the right hon. gentleman not think it would be much better to differentiate—the Air Service being a separate service—between the Air Service and the older services in which swords are needed?

Mr. Churchill: The matter was very carefully considered, and it was thought that the wearing of the sword was a symbol which was desirable.

### Royal Air Force Depot, Charlton

MR. CROOKS asked the Secretary of State for War and Air whether he is aware that the immediate clearance of the Royal Air Force stores from Charlton Rope Walk would result in the employment of 50 persons; and whether action will be taken to expedite the removal of these stores?

Mr. Churchill: As the right hon. member was informed, in reply to his previous question on November 5 last, the clearance of this depot depends entirely on the disposal of surplus stores at Kidbrooke, whither the material in question is being transferred. The desirability of handing over the accommodation without avoidable delay has been kept in view, and efforts are concentrated on clearing as quickly as space at Kidbrooke can be made available for the purpose.

### Officers' Titles

MR. PALMER asked the Secretary of State for War and Air whether a naval officer who was lent to the Air Service in which he attained the rank of lieutenant-colonel is entitled to retain that rank and to use the designation of lieutenant-colonel after reverting to his substantive rank in the Navy?

The Secretary of State for War and Air (Mr. Churchill): An officer holding a regular commission in the Navy or Army is not given permission to retain his Royal Air Force rank unless he also at the same time retires from the Navy or Army. An officer who subsequently retires from the Navy, and who wishes to retain his Royal Air Force title on retirement, should apply to the Air Ministry through the Admiralty for permission to do so.

Capt. W. Benn: Is the right hon. gentleman aware that the hon. and gallant gentleman referred to in this question rendered throughout the War the most gallant services to this country?

Lieut.-Com. Kenworthy: Has not His Majesty given permission to all officers who held temporary rank during the War to retain it if they so desire?

Mr. Churchill: I have answered the question on the paper. If there are any other questions I shall require notice in the regular way.

### R.A.F. Ex-Warrant Officers

SIR W. JOYNSON-HICKS, on May 6, asked the Secretary of State for War and Air whether ex-warrant officers who obtain commissions in the Royal Air Force as pilot officers were refused an addition to their pay when the new rates were issued on August 1, 1919; whether these officers were detained pending instructions as to pensions; and all the time received only the old rate of pay and allowances, while new officers doing the same work received the new rates of pay; and, if so, whether he will see that the difference in pay is made up to these officers?

Mr. Churchill: Hitherto the rule has been that the new rates of pay are

not issuable to officers holding temporary commissions in the Royal Air Force, and this rule has been applicable to some ex-warrant officers. The whole question of the retention of the old rates has been under consideration however, and it has been decided that officers now being paid at those rates may have the option of coming under the new scheme of pay and allowances with effect as from January 1, 1920. Orders stating the rates and conditions are in course of promulgation. All ex-warrant officers, therefore, are now allowed the option of coming on to the new scales of pay and allowances if they so desire.

### Post Office Aerial Service

MR. CLOUGH asked the Postmaster-General the results of the aerial post between London and the North of England; the average number of letters carried daily; and the loss sustained?

Mr. Illingworth: There is not, and has not at any time, been a regular aerial post between any places in the British Islands. In October, 1919, during the railway strike, an emergency service was set up between London and certain towns, but it was not necessary to maintain the service for more than a few days.

### Anti-Aircraft Defence

MAJ. GLYN on May 10 asked the Prime Minister under which Government Department the control and administration of anti-aircraft personnel in the metropolitan and the coastal area, respectively, is vested; how many officers and men are employed in these duties in both those areas, separately, and at what annual cost; and whether the whole matter can be reviewed in order to clear up existing misconceptions and to decide as to whether it is necessary to maintain permanent anti-aircraft personnel in the metropolitan area and not elsewhere, or vice versa, or to enlist officers and men for this duty on terms of service similar to the Territorial Army where required.

The Secretary of State for War and Air (Mr. Churchill): My right hon. friend has asked me to reply. Anti-aircraft personnel is controlled and administered by the War Office and the Air Ministry, the former being responsible for the personnel of the ground defences as distinct from air units. The numbers of military personnel at present employed in these duties are 77 officers and 288 other ranks (inclusive of depôts and anti-aircraft schools): of these, 35 officers and 142 other ranks are in and around the metropolitan area. The annual cost of the total number employed is £103,000. There is no Royal Air Force personnel specially engaged in these duties at present. As regards the last part of the question the whole subject of anti-aircraft defence is under review with a view to confining ourselves, for the present, to training and research, with corresponding reductions of establishments and to defining the future policy for the defence of the Empire.

Maj. Glyn: Is there any truth in the statement that the staff of the anti-aircraft defence of London has remained unchanged since the signing of the Armistice?

Mr. Churchill: No, I do not think so. At any rate, it seems to me that the number of officers and men provided for this extremely important branch of any defensive organisation which may be set up in this country is not at all on an exaggerated or extravagant scale.

Viscount Curzon: Can the right hon. gentleman explain why it should be necessary to keep 77 officers and only 200 men?

Mr. Churchill: I presume it is because the work in question is largely in the nature of research and experiment.

Brig.-Gen. Croft: Would not the solution of the question be to make the Germans hand over all their aeroplanes at once, and so remove the danger?

Mr. Churchill: At any rate, we ought not to lose touch with the means of protecting ourselves from aerial attack, and still less ought we to cut ourselves off from even pursuing the theory of defence against potential aerial attack.

Mr. Billing: Is it not a fact that this force today is much more efficient than at any time during the War?

Mr. Churchill: You are a better judge than I am.

### To Our Readers

As we continually receive complaints from readers that they experience difficulty in obtaining their copy of *FLIGHT* promptly each week, we draw their attention to the subscription form which is printed on page xxii of the current issue. If this is sent, accompanied by the appropriate remittance, to the publishing offices, 36, Great Queen Street, W.C., it will ensure *FLIGHT* being received regularly each week upon the day of publication.

### A Famous Machine for Felixstowe

At the last meeting of the Felixstowe Town Council it transpired that the clerk had been in communication with the object of securing for the town the Sopwith Camel aeroplane in which Capt. Culley attacked and destroyed a Zeppelin off the Island of Borkum. Word had been received that the machine would be handed over to the town as a war memento if a suitable shelter was found for it. A suggestion was made that the Spa Pavilion would be a good place, and it was left to the Clerk and Surveyor to make arrangements.

### H.P. Service Records

It is now possible to give the record of Handley Page aeroplanes for a complete year in all parts of the world. During the twelve months, May 1, 1919, to May 1, 1920, in the United Kingdom and abroad, H.P. machines carried 4,481 passengers, 72,563 lbs. of freight, the mileage covered aggregating 101,568 miles. On the Continental Air Services in conjunction with Cie Messageries Aeriennes, during the

period September 2, 1919, to May 1, 1920, 1,280 passengers were carried, 71,070 lbs. of freight, while the aggregate mileage covered was 94,437 miles.

### Aerial Mails Lost

ONE of the mail planes to Paris on April 28, in charge of a French pilot Hanin Gabriel, fell into the sea 12 miles west of Vergoyer. The pilot was rescued by a sailing boat, but the machine and mails were lost.

### Dunkerque—R.N.A.S.—R.A.F. Reunion

THE Second Annual Dinner for officers who served in the Dunkerque Command of the Royal Naval Air Service and Royal Air Force from 1914 to the Armistice, will be held at the Adelphi Hotel on Wednesday, June 30, at 7 p.m. Those who wish to be present are requested to communicate with Air Commodore G. L. Lambe, C.B., C.M.G., D.S.O., Room 716, Air Ministry, by not later than June 22, as the number is limited. Envelopes should be marked "Dunkerque Dinner," and the tickets cost £1 each.

### Blimps for Canada and S.A.

ALTHOUGH Australia has declined the "Blimps" as not being suitable for the work in hand, some of them are going to Canada. It is understood that the British Government is presenting nine, including two or three Coastals and several "S.S. Zeros," to the Canadian Government for the use of the Canadian Air Board.

Four of the Zeros are also being handed over to the South African Government.



## AIRCRAFT AND THE TURKISH TREATY

As will be seen from the following extracts from the official summary of the Peace terms presented to Turkey, the clauses relating to aerial matters are similar to those in the German and Austrian treaties, with certain important additions, as, for instance, those relating to the establishment of aerodromes.

### PART V.—Air

The air clauses provide that no military or naval air forces are to be maintained by Turkey; that the entire Turkish Air Force personnel is to be demobilised within two months; and that the aircraft of the Allied Powers are to have freedom of passage over and transit and landing throughout Turkish territory until the complete evacuation of Turkey by the Allies.

The manufacture, importation, and exportation of aircraft or their component parts in Turkish territory during six months following the coming into force of the Treaty is forbidden. All military and naval aircraft (including dirigibles) either complete or in process of manufacture, assembling, or repair, all aeronautical material, armament, munitions, and instruments are to be delivered to the principal Allied Powers within three months from the signing of the Treaty. The air navigation clauses follow the lines of those in the other Peace Treaties.

### Inter-Allied Commissions

These clauses provide that the military, naval, and air clauses of the Treaty are to be executed under the control of military, naval, and aeronautical Inter-Allied Commissions, of which the upkeep and expenditure are to be borne by Turkey.

With the exception of the special section of the Military Inter-Allied Commission of Control and Organisation, which is to supervise the control, organisation, and distribution of

the new Turkish armed force, these Commissions will cease to operate when their work is completed. This section is to operate for a period of five years from the signing of the Treaty. At the end of this period the principal Allied Powers are to decide whether the activities of the Commission shall continue.

Representatives from each of the three Commissions will be appointed to control jointly the measures to be taken with regard to safeguarding the zone of the Straits.

### PART X.—Aerial Navigation

Turkey agrees to accord the aircraft of the Allied Powers full liberty of passage and landing over and in the territory and territorial waters of Turkey, freedom of transit, the use of all aerodromes in Turkey open to national public traffic, and equal treatment generally in these matters with Turkish aircraft and most favoured nation treatment as regards internal commercial air traffic. Turkey also undertakes to establish aerodromes in localities designated by the Allied Powers, and the Allies reserve the right in certain eventualities to take measures to ensure international aerial navigation over the territory and territorial waters of Turkey.

States who fought on Turkey's side in the late war are debarred from these privileges and from the grant, without Allied consent, of concessions for civil aerial navigation, unless and until they become members of the League of Nations or are permitted to adhere to the Convention of October 13, 1919, regarding aerial navigation. Turkey agrees to enforce the compliance by Turkish aircraft with the rules and regulations resulting from the latter Convention. The obligations imposed by this chapter remain in force until Turkey is admitted to the League of Nations or permitted to adhere to the above-mentioned Convention.

## THE AIR NAVIGATION BILL

IN the House of Lords on Tuesday, May 4, the Marquess of Londonderry, on behalf of the Air Ministry, introduced a Bill on the subject of air navigation, and it was read a first time.

In the Memorandum which prefaces the Bill, it is pointed out that this Bill will enable effect to be given to the Convention on Air Navigation which was signed on behalf of His Majesty in Paris on October 13, 1919, and was presented to Parliament last year. The Bill contains the necessary power to give effect to the Convention, and it is proposed to apply the principles of the Convention not only as respects the cases to which it specifically relates, that is to say, international

flying, but also to internal flying in the British Islands. The Bill repeals the existing statutes governing air navigation, which will in future be regulated entirely by the principles adopted in the Convention and applied by this Bill.

Part II of the Bill effects some specific amendments in the law, which are partly incidental to carrying the Convention into effect. It contains special provisions for the control of aviation in the case of national emergency, and defines certain principles of liability in relation to damage caused by aircraft to property on land or water.

The Bill, which was read a second time on May 11, is commented upon editorially on p. 516.

### An International Aerodrome in Berlin

FROM a message received in Paris from Geneva it appears that a scheme is on foot for the establishment of a large aircraft factory in Berlin where aeroplanes of all types will be built. It is also stated that an International Aerodrome is being planned, and that the Aeronautics Department of the Empire and the Inter-Allied Commission have signified their assent to the scheme.

### Paris to Warsaw via Prague

CAPT. DEULLIN, Lieut. de Fleurien and a mechanic, on a Potez biplane left Paris on May 3 for Warsaw, and landed at Prague. They stopped at Strasbourg for lunch and their flying time between Paris and Prague worked out to 4 hrs. 55 mins. They flew the 800 kilos to Warsaw in 3 hrs. 30 mins. on the following day.

### Poland Orders from Italy

POLAND is evidently fully alive to the possibilities of aviation, for it is stated that an order has been placed with Italian firms for over 400 aeroplanes.

### Bolshevists Lose Aeroplanes

It has been officially stated from Warsaw that the booty captured by the Poles from the Bolshevists up to May 4 included two aeroplanes.

### Lenin's Pilot Arrested

WORD comes from Kovno, Lithuania, that an aeroplane which recently made a forced landing outside the city carried Fritz Platten, the Swiss Social Democrat leader (who negotiated the passage of Lenin and Trotsky through Germany to Russia), his wife, and two Germans. Platten was arrested, as his luggage contained large quantities of Bolshevik propaganda; but the Swiss Government has stated that it will not apply for his extradition.

### A Swedish-Finnish Service

A REGULAR air service between Stockholm and Helsingfors started on May 5, when an aeroplane left Stockholm at 2 p.m. and arrived at Helsingfors at 6.30 p.m.

### The 5-Engine Caudron Goes South

THE 5-engined Caudron on May 5 flew from Paris to St. Raphael, taking 4 hours 9½ mins. for the journey, the speed working out to over 200 kiloms. per hour (124 m.p.h.).

### The Rome-Tokyou Flight

LIEUT. RANZA arrived at Calcutta from Allahabad on May 7. Lieut. Ferrarin was reported at Tsingtau on May 10.

### Mails by Air in China

"AN aerial mail between Peking and Tientsin was inaugurated on May 7," reports the *Daily Mail* correspondent in the latter place. "A big Handley-Page aeroplane brought mails and passengers, including Mr. B. F. Alston, British Minister to China."

### Brazil to England Flight Turned Down

"A TECHNICAL committee reports unfavourably on Capt. A. M. Zuloaga's projected Transatlantic aeroplane flight of 8,000 miles from Plymouth to Buenos Ayres via Portugal," states the *Daily Mail* correspondent at Buenos Ayres. "The committee's objection is based on the cost, estimated at £200,000. The Argentine Government is not disposed to accept either the financial risk or the responsibility attaching to the undertaking."

### The Emir Abdullah Interested

IN honour of the Emir Abdullah the R.A.F. gave an admirable aerial display at Cairo, on May 8, and during the visit the Emir was photographed in an aeroplane. He was deeply interested in the display, particularly when two of his suite made a short flight.



## TRADE ENVOYS BY AIR

ADDRESSING the annual meeting of the Inter-Parliamentary Commercial Conference in Paris, on the Effect of Aerial Transport on International Commercial Relations, Mr. C. Kenneth Murchison, M.P., said that when Central Europe finally settled down to peace it would be of the utmost importance that regular aerial communications should first be established between those parts of the world where it was most necessary to improve commercial relations.

Trade with Poland, Czecho-Slovakia, Rumania, Hungary, and Yugo-Slavia would depend very largely on the rapidity with which representatives of nations like France and Great Britain, could reach them and negotiate with them for the sale of manufactured articles in exchange for whatever raw material they might be prepared to export. It would be necessary for men of experience to visit these countries and inspect in person the localities in which concessions were offered, and for such work as this aerial transport was particularly suitable.

The aerial mail services between London and Paris ran with the regularity of a train or steamship service and that was in a part of the world which was the least favourable to aerial communication. It might safely be said that air services established in any other part of the world would show a very much higher percentage of regularity than any service between England and France. Payment of a share of the depreciation of machines on a high scale did not appear to him to be just to the State. It was inconceivable that the Government could pay for a machine that was doing nothing to advance commercial aviation, the furtherance of which was one of the main reasons for the payment of any subsidy.

It would be fairer to pay a proportion of the running costs when the aeroplane was employed on an approved and consequently useful service, in addition to a small percentage of the annual depreciation of the aeroplanes engaged.

## ADVISORY COMMITTEE REPORTS

DURING the month of April, H.M. Stationery Office have published the following Reports of the Advisory Committee for Aeronautics:—

Internal-Combustion Engine Sub-Committee Reports:—

42. Relation between the Output of a Magneto and its Size and Weight. Notes on. April, 1918. Price 1d.

43. Experiments on the Ignition of Explosive Mixtures by Sparks. January, 1918. Price 2d.

Reports and Memoranda:—

482. Experiments on a Model of a Modified Form of the N.S. Non-Rigid Airship. (With diagrams.) January, 1918. Price 4d.

564. Experiments in a Wind Channel on Elongated Bodies of Approximately Streamline Form. Part I. Evaluation of the Error in Resistance Measurements

due to the Variation of Pressure along the Longitudinal Axis of the Channel. (With diagrams.) December, 1918. Price 6d.

568. Study of Solvents of Cellulose Esters. Preliminary Report. (With diagrams.) December, 1918. Price 1s.

585. Action on Fabrics and its Prevention. Further Experiments upon the. (With diagram.) February, 1919. Price 3d.

635. Effect of Minimal Amounts of Acid on the Strength of Cotton and Linen. July, 1918. Price 2d.

Technical Report for 1914-15. (With Appendices.) Price 12s.

Previous lists appeared in FLIGHT, July 3, 1919, October 23, 1919, February 19, 1920, April 22, 1920.

### Flying over Danish Waters

THE Danish Minister of Marine has issued instructions to the staffs of the undermentioned lighthouses and lightships to report all aircraft seen by them. These reports will be telegraphed to the Flying Boat Station at Copenhagen and will state the time of observations, approximate course, and, if possible, registration and other marks of identification. In order to facilitate observations and thus maintain a reliable and efficient service, pilots are requested to fly where possible over these observation stations at the lowest altitude consistent with safety or as near as may be convenient.

Information regarding these reports may be obtained from the Flying Boat Station at Copenhagen—telephone No. "Military 155."

#### (a) Lighthouses

Name.	Lat. N.	Long. E.	Name.	Lat. N.	Long. E.
Anholt ..	56 44	11 39	Knudshoved	55 17	10 51
Fornaes ..	56 27	10 58	Kronborg ..	56 02	12 38
Giedser ..	54 34	11 58	Revsnaes ..	55 45	10 52
Hammeren ..	55 16	14 46	Sejro ..	55 55	11 05
Hanstholm ..	57 07	8 36	Skagen ..	57 44	10 38
Hirshals ..	57 35	9 57	Sprogo ..	55 20	10 58
Hirsholm ..	57 29	10 38	Stevns Klint	55 17	12 27
Kielsnor ..	54 44	10 43	Vestborg ..	55 46	10 33

#### (b) Lightships

Name.	Lat. N.	Long. E.	Name.	Lat. N.	Long. E.
Drogden ..	55 33	12 43	Laeso-Trindel	57 26	11 17
Laeso-Rende	57 13	10 42	Schultz's		
			Grund ..	56 09	11 11

#### (c) Lightships to be placed in position shortly.

Name.	Lat. N.	Long. E.	Name.	Lat. N.	Long. E.
Graadyb ..	55 20	8 05	Vye ..	55 24	7 44
Horns Rev.	55 34	7 19			

(A. M. Notice to Airmen No. 51).

### A Record Flight to Copenhagen

AN "Aircro 9" biplane, piloted by Lieut. McMullen, and carrying two passengers, made a record trip from London to Copenhagen on May 7. Leaving Croydon at 9.30 a.m., the passengers landed at Amsterdam, stayed three hours for

lunch, etc., landed at Hamburg and stayed an hour for tea and yet the journey to Copenhagen was completed by 5 p.m. The last stage of the journey was made through a storm of hail, snow and rain. The telegram announcing the arrival of the machine at Copenhagen occupied a longer time in transmission between Copenhagen and London than the aeroplane's journey. The flight was undertaken at a few hours' notice by the aeroplane hire department of Aircraft Transport and Travel, Ltd. A regular service between London and Copenhagen in conjunction with Dutch, Danish, and German firms is contemplated.

### A Supermarine for Bermuda

ANOTHER of the Supermarine flying-boats for the Bermuda flying-boat service, which is being run by the Bermuda and West Atlantic Aviation Co., Ltd., was put through its tests on April 29, and was dismantled immediately afterwards for packing and shipment. With it will go a consignment of spare parts which will enable a continuous service to be maintained throughout the season.

### U.S. Aircraft Carriers

It has been decided by the American Navy Department that the aircraft tender hitherto known as No. 290, which is at present under construction at Hog Island, Pa., shall be named "The Wright," in memory of Wilbur Wright. The collier "Jupiter," which is being converted into an aircraft carrier, has had her name changed to "Langley," in memory of Professor Samuel Pierpont Langley, the distinguished American astronomer and physicist. The "Langley" is interesting as having been the first vessel of the American Navy in which the system of electric propulsion was installed, and as a result of the success of this experiment the battleship "New Mexico" was also fitted with the electric drive.

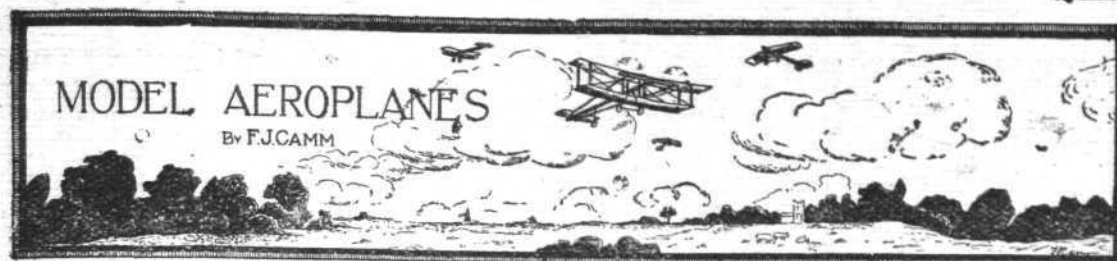
### An Inter-University Meeting in U.S.

AT the first Inter-Collegiate Aerial Race Meeting, which opened at Mineola on May 7, Yale University securing the first honours by winning a 25 mile race, the University of Pennsylvania obtaining second place. Mr. Henry Thorne, the pilot of the Yale aeroplane, flew the distance in 16 mins.

### A Long Trip in U.S.

A SEAPLANE of the United States Navy type, with three occupants, recently flew from Miami (South Florida) to the Hudson River, landing near 26th-street, New York, after a 15 hours' flight with one stop.





NOTE.—All communications should be addressed to the Model Editor.

### Some Further Theoretical Points

I have stated that the speed of an aeroplane depends somewhat upon its design. Given the same power available, a biplane or triplane will not travel at quite such a high speed as a monoplane of simple construction, because of the greater complexity of frame members and wires in the multiplane type. At least that is so according to theory, but I cannot say I have found it so with my models, for some of the biplanes having an equal quantity of rubber on have travelled as fast as the monoplanes. Neither does it appear to be quite borne out in actual practice with large machines.

This talk about the relative speeds of types is only put forward as an argument tending to show that the design of the machine, at any rate as regards models, need not be considered in calculating the speed. Now the speed must be known before we can arrive at the area of surface required. The best way to obtain the rate of travel will be to first make the propeller, having already got the motor. This should be as large as possible. There is no rule regarding either diameter or pitch of screw, but from what I have written an idea may be gathered as to the relationship between weight and power of the motor and the size of propeller. It may be taken as a general rule that a large diameter screw is better than a small one, but the longer the blades are made the narrower must they be, or else the pitch angle must be reduced. It is not a bad rule to make the pitch 50 per cent. longer than the diameter of the screw. The pitch angle is thus always  $\frac{1}{2}$  in  $2 \cdot 09$ . The diameter can then be based upon the maximum torque available, the radius in inches being made the same as the number of inch-ounces torque. Thus, if the torque is three inch-ounces, make the screw three-inch radius, i.e., 6 ins. in diameter. This is for screws which are portions of a true helix.

The width of blade will have an important bearing upon the diameter. Of course, a portion of a helix will have blades which gradually increase in width from the centre outwards. There are reasons why this, although a true theoretical screw, may not be the best form for a propeller to take. The writer favours a screw with blades which are wide at the base and taper off gradually to the tips. Such a propeller can still be a true screw, and can be made of larger diameter, weight for weight, than any other kind. The centrifugal stresses are not so great, and the pressures at different points on the blades are adjusted by the width.

A propeller of this form may be made of such a diameter that the radius in inches equals 50 per cent. more than the number of inch-ounces torque; so that if the torque is 3 ozs. the radius will be  $4\frac{1}{2}$  ins., that is to say 9 ins. diameter. In such propellers the blades may have a mean width of one-twelfth of the diameter. Thus a 9-in. screw would have blades  $\frac{3}{4}$  in. wide at the middle of their length. At the tips the width may be  $\frac{1}{8}$  in., and at the centre of the propeller the width should be  $\frac{1}{8}$  in.

Having made the screw to the size most suitable for the motor to be used, attach it to the spindle upon which it is to be driven, the spindle which gives the required torque. Now wind up the spring and count the number of revolutions made by the screw whilst the spring is unwinding. This may be done either with a revolution-counter, which probably will not be available, in which case a cyclometer may be improvised, or by allowing the propeller to run slowly by retarding its speed of revolution with the finger, counting the number of turns made. This number multiplied by the length of pitch gives the theoretical distance travelled. From this theoretical distance a certain allowance must be made for slip of the screw, which may vary between 10 per cent. and 30 per cent., and if the propeller is well finished and correctly made a fair allowance would be 20 per cent. The loss in slip on many of my models came out no higher than 14 per cent.

To take as an example a supposed propeller with a length of pitch of 18 ins. or 1.5 ft., we find by running down the motor that the propeller makes 150 revolutions, and at each revolution the propeller theoretically travels 1.5 ft., therefore  $150 \times 1.5 = 225$  ft. travelled, less 20 per cent. allowance for slip  $\frac{225}{1} \times \frac{20}{100} = 180$  ft. actual length of flight.

We next require to know the speed at which the machine will travel. This is simply a matter of testing the number of

revolutions in a certain period of time. Wind up the motor again, and with a stop-watch (or an ordinary watch if the movements of the second hand can be followed accurately) ready to hand, release the propeller, noting carefully the number of seconds from the start to the time when the propeller ceases to revolve. Suppose we find that the time taken is eight seconds, this will mean that the machine will travel 180 ft. in 8 secs., or 1,350 ft. per min, 81,000 ft. per hour; that is to say the speed will be 15.3 m.p.h. With this velocity as one of the factors the surface can be calculated by the equation given in a previous article.

It may be questioned as to whether I am correct in stating that the speed of the machine will be the same as the speed calculated by the above method. My experience is that it is quite correct to do so provided that the percentage allowed for slip comes out correct. As I have already mentioned, the work done by a fixed propeller is all expended in slip, whereas when attached to a moving machine only a fifth part or so goes in slip, the rest of the power being absorbed in driving the machine. If through bad workmanship or design, either in the screw or the aeroplane, the percentage of slip is higher than the 20 per cent., the machine will not travel the calculated distance, and so the velocity will be decreased below that calculated, in which case the area of the surface will not be found sufficient. This points to the fact that it is well to make a fairly liberal allowance for slip, and should the slip then come out lower than the percentage estimated, the results will be all the better and the machine will fly with a greater factor of certainty.

There is another point worth mentioning in connection with calculating the speed from the time and revolutions of a fixed propeller, that is the question of thrust. It is still a much-debated point as to whether the thrust of a fixed screw is the same as that of a travelling screw. Personally I can see no reason whatever why there should be any difference. When the screw is fixed it displaces and drives a column of air backwards, and the slip is 100 per cent. If the screw be allowed to move by its thrust forward with a heavy resistance, the slip may be 50 per cent.; in certain circumstances with no resistance the slip could be reduced to nil, and it seems to me that the work done must be the same in each case. I have timed my models carefully in flight and in still air, and found that in most cases the time occupied in flight agreed exactly with the time taken to run down the same propeller with the same motor, the same number of windings being given in each case. Therefore, the work done and, consequently, the thrust must be the same.

Next week I propose to give some notes and sketches touching details of construction of models generally, and then I shall proceed with a design for a larger model driven by compressed-air, which will be an example of the practical application of the theoretical principles I have set forth in what possibly some of my readers have thought rather a tedious manner.

### Sheffield Aero Club

A SPECIAL meeting of the Sheffield Aero Club will be held at the Wentworth Café, Pinstone Street, Sheffield, on Wednesday, June 9, at 8 p.m.; in Room No. 2.

Those interested who wish to become members are invited to attend.

A model flying competition for hand-launched models will be held on Saturday, July 24. First prize: 5s. worth of model aeroplane accessories (winner's own selection). Second prize: 1 pair 9-in. carved wood propellers. Third prize: "Model Aeroplanes" (fully illustrated), published by Cassell's. The competition is an open one, and the entrance fee is 3d. each competitor. All entries should be handed in to Mr. Gregory, 130, Ecclesall Road, or Mr. Cudworth, 41, Coniston Road, Abbeydale, by July 10.

For further particulars and rules of the competition apply to Mr. Gregory or Mr. Cudworth at 41, Coniston Road, Abbeydale, Sheffield.

### Replies to Correspondents

J.V.F. (Haverstock Hill) and M.A.S.R. (Bath).—We replied direct to your letters.

A.L.R. (Highgate).—We are dealing with your letter subsequently.

A.O.G. (Worthing).—A drawing will be given in the next issue.



## SIDEWINDS

THE Institute of Industrial Administration, of 110, Victoria Street, S.W. 1, held their first general meeting at the Central Hall, Westminster, on April 27, 150 members attending. The Hon. Secretary announced very wide support from both London and the Provinces, and also a promise by Lord Haldane to address the members on the subject of "Administration." A Provisional Committee was appointed, representing many branches of industry. As an immediate step in the work of the Institute, a series of lectures on "The Organisation of Payment by Results," is being given at the Central Hall, Westminster, on Thursdays.

FROM Messrs. Brown Brothers, of Great Eastern Street, come particulars of a new type of electric side lamp for fixing on mudguards. You will agree that this is a smartly-designed article. The body is spun in one piece, the front lens is a bull's-eye, and there is a ruby lens at the back. The plate for fixing the lamp to the underside of the mudguards is cupped out so that it completely covers the lamp adaptor, making it practically watertight and mudproof. This lamp is supplied in brass finish at £2 10s., nickel finish £2 15s., and all-black finish £2 17s. 6d. per pair in each case.

THAT aircraft can transport loads which are hardly to be termed "light" was brought out the other day, when five large casks containing veronal were brought to London from Paris in a Handley Page aeroplane. Each cask was over 6 ft. in girth and 2 ft. in height and width, the consignment weighing 1,200 lbs.

To encourage business firms to consign freight by air, a reduction in rates for large quantities has been instituted. The scale is as follows:—Shipments up to 10 lbs. in weight, 2s. 6d. per lb.; from 10 lbs. to 20 lbs., 2s. 3d. per lb.; from 20 lbs. to 50 lbs., 2s. per lb.; from 50 lbs. to 100 lbs., 1s. 9d. per lb.; weighing 100 lbs. and over, 1s. 6d. per lb.; passenger baggage (unaccompanied by passengers), 1s. 6d. per lb.; minimum freight, 5s. per lb.

THE passenger fares on these services are £15 15s. single and £31 10s. return. Season tickets for twelve single flights between London and Paris can be purchased for £120.

HANDLEY PAGE Commercial aeroplanes with advertisements painted on their great planes are becoming quite a familiar spectacle in South Africa and India, and this form of publicity seems likely to become universally popular, as commercial flying develops in those countries. An aeroplane displaying advertisements in huge brightly-printed letters can be seen for a considerable distance, and when passing over a town the majority of inhabitants read the announcements.



Part of a Handley Page "cargo," consisting of 5 casks of veronal in powder, weighing 1,200 lbs., brought over on April 28. The size of the casks is: Height 2 ft. 2½ ins., width 2 ft. 1½ ins., girth 6 ft. 6½ ins. The total cargo brought on this machine, by Pilot R. N. McIntosh, was 1,468 lbs., plus 4 passengers.

## IMPORTS AND EXPORTS, 1919-1920

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; and for 1919, see "FLIGHT" for January 22, 1920.

	Imports.		Exports.		Re-Exportation.	
	1919.	1920.	1919.	1920.	1919.	1920.
January ...	555,989	2,323	57,571	32,752	—	697
February ...	453,822	9,320	57,972	68,932	—	—
March ...	704,424	2,092	72,716	67,600	400	—
April ...	97,662	5,918	25,433	148,484	—	—
	1,811,897	19,653	213,692	317,768	400	697

## AERONAUTICAL PATENTS PUBLISHED

Abbreviations:—cyl. = cylinder; I.C. = internal combustion; m. = motors.

### APPLIED FOR IN 1916

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published May 13, 1920.

15,468. GENERAL ELECTRIC Co. Wireless telephone systems. (141,386.)

### APPLIED FOR IN 1918

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published May 13, 1920.

20,827 W. E. BEASLEY, W. BEEDLE AND H. EVERITT. Wheels for aircraft, etc.. (141,405.)

### APPLIED FOR IN 1919

The numbers in brackets are those under which the Specifications will be printed and abridged etc.

Published May 6, 1920

- 818. W. G. HARDING. Gyroscopes. (141,139.)
- 1,031. D. J. MOONEY AND D. H. EMBY. Metal spars. (141,141.)
- 4,602. PARNALL AND SONS AND H. BOLAS. Locking means for inspection doors of aeroplane cowling. (141,156.)
- 7,430. I. P. MILLAR. Wheel-carrying frames for aircraft, etc. (141,179.)
- 9,168. J. ERSKINE-MURRAY AND J. ROBINSON. Wireless apparatus. (141,190.)
- 28,908. A. V. ROE. Rudders for aeroplanes. (135,138.)
- 30,137. R. ALLEN. Yokes or clamps for gun mountings in aircraft. (141,298.)
- 776. G. DE BOTHEZAT. Propellers. (141,416.)
- 2,664. E. S. G. REES. Aeroplanes, etc. (141,445.)
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